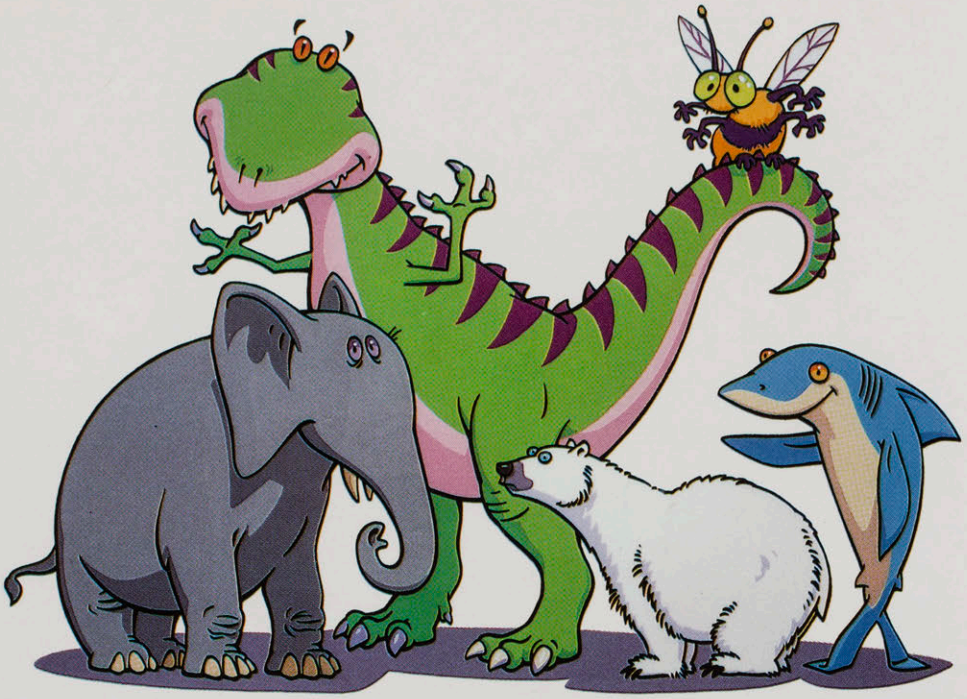
TERRA

MAGAZINE OF THE
NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY

VOLUME 31, NUMBER 4
SUMMER 1993



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Marion Oettinger

Conquest Dancer, Chichicastenango, Guatemala, 1991. On saints' days and other festive occasions in Guatemala, dance groups dramatize the Spanish conquest of the Quiche nation and remind people of the differences between good and evil.

TERRA

THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

VOLUME 31 SUMMER
NUMBER 4 1993

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TERRA is published by the Natural History Museum of Los Angeles County and is sent as a benefit to Museum Members. Single copy price: $4. Subscriptions: $14 per year. For membership information, visit the Membership Office at the Natural History Museum or call 213/744-3426. All other inquiries may be directed to the Publications Office, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007. Printed by Dai Nippon Printing Company, Hong Kong. Typography by Keyboard Network.

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ISSN 0040-3733.

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Museum on the Move

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MUSEUM APPOINTS NEW ENTOMOLOGY CURATOR Dr. Brian V. Brown has joined the Natural History Museum as Assistant Curator of Entomology. Dr. Brown is responsible for helping to curate the insect collection, especially the Diptera or true flies. He has conducted field research in North America, Latin America, Southeast Asia, and Europe, concentrating on the study of phorid flies. His current research is on the systematics and host-parasite interactions of the huge parasitic genus *Apocephalus,* commonly known as the "ant-decapitating flies." Dr. Brown earned his doctorate at the University of Alberta in Canada, and recently finished a two-year postdoctoral fellowship at the Smithsonian Institution in Washington, D.C.

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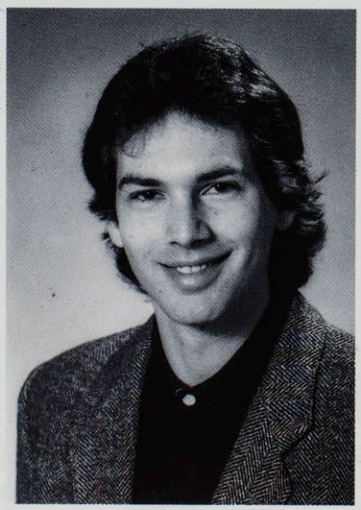


Dr. Brian V. Brown

ACQUISITIONS

RESEARCH LIBRARY ACQUIRES SCHOLAR'S COLLECTION The Research Library has received a significant gift of paleontological monographs, reprints, and journals from Heinz Lowenstam, Professor Emeritus of Paleontology at the California Institute of Technology. Dr. Lowenstam, whose interests in mineralogy and paleontology date from his boyhood days in Germany, earned his Ph.D. at the University of Chicago in 1939. His discovery in the early 1960s that invertebrates called chitons had teeth harder than limestone made him a pioneer in the subject of biomineralization. The library is pleased and honored to add to its resources the lifelong working collection of this eminent scholar.

MUSEUM NEWS

RARE OPPORTUNITY IN CRUSTACEA Dr. Jody W. Martin, Associate Curator of Crustacea, will lead a team of six internationally known scientists, including museum zoologists Hans Kuck and Dr. Gordon Hendler, to Cocos Island in February of 1994 to photograph and document its decapod crustacean fauna (crabs, shrimps, lobsters) for 12 days. Cocos is a beautiful, unspoiled, rain-forested island teeming with marine life. Four extra spaces are available on a first come, first served basis for licensed SCUBA divers. Cost will be $2,500 per person excluding air fare to Costa Rica. Interested persons should write Dr. Martin care of the museum's Life Sciences Division.

DEVELOPMENT

FELLOWS The Fellows began the New Year with a children's activity featuring Dinosaurs!, the popular Kokoro animated exhibit. Many children and grandchildren came to view the dinosaurs and to take a behind-the-scenes tour of the habitats department. Their day ended with dinosaur crafts in the Discovery Center. In February, Fellows joined John Heyning for their annual whalewatch excursion, enjoying brunch in Ports O'Call Village and spending the afternoon exploring tidepools.

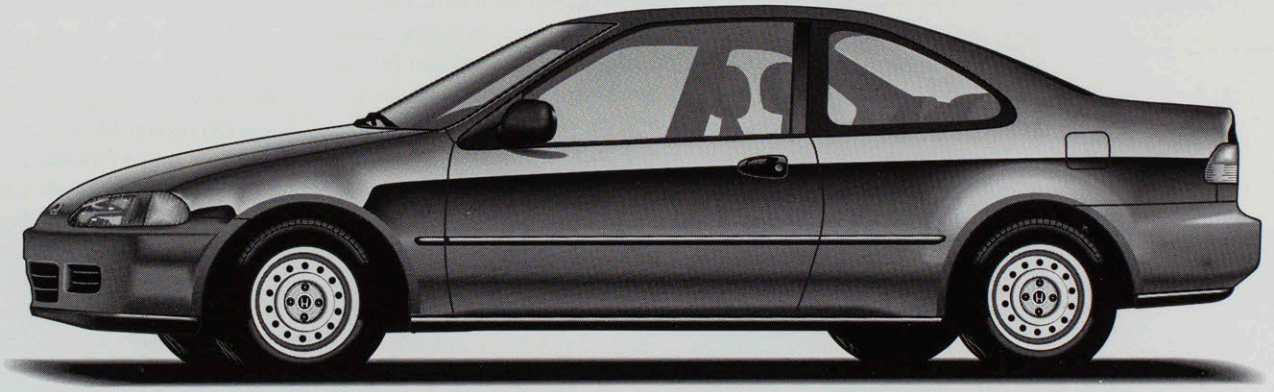
Joan and Arnold Travis offered their home in March to hold a stone-tool-making demonstration. Kathy Schick and Nicholas Toth gave a presentation based on their 20 years of research on how early man made and used tools. Also in March, the Fellows enjoyed a fascinating private tour of the Jet Propulsion Laboratory in Pasadena, with an afternoon reception at the home of Bill and Toni Bird. Fellows gathered in strong support of museum educational programming at the Dinosaur Ball held on March 20 at the George C. Page Museum of La Brea Discoveries. May found the Fellows celebrating the opening of the museum's newest affiliate, the Burbank Museum.

OPEN HOUSE A SUCCESS Open House '93 was held on February 5. Staff and volunteers spent many months preparing each of their areas for this popular annual members event. More than 3,600 members came to the museum to explore every floor and talk with curators about their research. In addition, guests were treated to an exciting array of ethnic entertainment groups ranging from rap to square dancing. Generous contributions to the evening were made by Plaza De La Raza, "Wanted," The Pioneer 8s, Allied Sales and Distri-

Christopher Barr

Two visitors examine a plylogenetic arrangement of mollusks in the Malacology Section at the 1993 Open House.

Sit down and take a test look.



Those looks are natural, by the way. The beautiful shape of the new Civic DX Coupe was formed by wind tunnel testing.

But there is more to see. There is the comfortable, roomy interior. The 16-valve fuel-injected engine. And a standard driver's side airbag which offers added protection when the seat belt is worn.

Then there's the test drive, which is an altogether different experience. And one you are bound to love. You'll find out first-hand why the new Civic DX Coupe is a very personal car.

Finally, there is something to see that you'll find unbelievable on a car that offers so much. The affordable price.

You will want to sit down for that, too.

HONDA

The Civic DX Coupe

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Habitats Lab

ABOVE AND LEFT

On the evening of February 5th, members toured the museum's five floors, exploring the collections, previewing exhibit halls under construction, participating in crafts activities, and purchasing unique items at the annual Members' Open House.

bution, Garden of Eatin', The Haagen-Dazs Company, Hansen Beverage Company, Lawry's Foods, Inc., Margarita Jones Restaurant, Sparklett's Water Company, Mother's Cake and Cookie Company, FIBAR, The Price Club, Sunkist Growers, Inc., Trader Joe's, and Western Bagel Baking Corporation.

■ **CORPORATE, FOUNDATION, AND INDIVIDUAL SUPPORT** The Thomas and Dorothy Leavey Foundation has pledged a major gift toward the museum's core educational outreach programs: Classroom Collections, School Tours, and Volunteer Programs. Classroom Collections circulates natural science specimens, historical artifacts, and models to 30 different school districts in southern California. Each year through our School Tours, nearly 200,000 Los Angeles schoolchildren visit the museum's galleries and permanent exhibitions with the expert guidance of our docents. The Volunteer Program trains the dedicated volunteers who lead these tours, assist curators in their research, and staff the museum's membership and information desks. Last year these valued men and women devoted more than 130,000 hours to the museum — a commitment of highly skilled talent and service equivalent to over $1 million.

Other southern California foundations and corporations are also helping sustain the museum's education programs, which reach over 750,000 children and families each year. The UNOCAL and Gilmore foundations provided support for

continued on page 46

Stalking the Folk Art of Latin America

by Marion Oettinger, Jr.

Jean Charlot, the late French painter and keen observer of Latin American art, recalls that during the 1920s in Mexico, "folk art was everywhere: devotees bribed saints with ex-votos, lovers melted the hearts of their beloveds with portraits, artisans and merchants hired the painter to beautify their shops with murals and thus increased business. Sculpture existed for specialized aims — dark pieces, idols of secret worship, semblances used for black magic; innocent pieces, those marvelous toys worth a few cents, beautiful as Han tomb figures. The output was so varied as to be unclassifiable, so cheap as to be despised, so close to all, so thrust under everyone's eyes as to become invisible."

TODAY, AS IN CHARLOT'S TIME, folk art can be found everywhere, especially in less industrialized regions of Latin America. It is still seen in the home, adorning a family's altar or adding a bit of color and decoration to the rustic furnishings of a peasant hut. It is incorporated into architecture, local advertising, culinary habits, religious ritual, and political custom. It can be very durable, as in stone sculpture or church retablos, or it can be ephemeral, made to endure only as long as the occasion upon which it is used. Because it is so present, so much a part of the texture of Latin American life, folk art is often overlooked or discounted.

As with all art, we tend to appreciate only those things traditionally taught us. We often think of religious art, for example, as being limited to the finely carved statuary and the elegantly framed paintings which once graced the altars of great cathedrals or hung in the naves of our churches. But in fact religious art extends far beyond those two categories. It also comprises the vestments worn by the visiting priest in a rural community, the vivid arrangement of flowers on an altar, the elaborately molded candles that quickly disappear before our eyes, special food eaten during feast days, grave markers in an atrium cemetery just outside the church portals, and the dance masks and costumes worn by pilgrims who annually come to worship in important shrines all over Latin America. All of these things are valid forms of folk expression and all are valuable windows on the essence of Latin American society.

In 1988 I was invited by the Museum of American Folk Art in New York to be guest curator of a major exhibition of Latin American folk art. We decided to include only those objects made *by* Latinos *for* Latinos, and we decided that, whenever possible, I would travel to the source of folk art to record the context in which it was made and to photograph the processes involved. I visited 13 countries in the Caribbean, Central America, and South America to assemble the exhibition collection, and I became aware during these visits of just how often the strongest visual expressions of folk culture do not lend themselves to removal from their intended context. Thus Puerto Rican murals advertising trades or professional services — or hand-painted and intricately carved peasant huts in rural Haiti, boldly risque carnival floats in Brazil, dramatic roadside shrines in Venezuela — had to remain where they were made and most appropriately used. I resolved to return home with photographs rather than the objects themselves; nevertheless, I collected over 325 important objects from a wide variety of locations and contexts. Each, in its own way, provides a special perspective on Latin society, and each offers us yet another opportunity to explore the richness of Latin American culture.

OPPOSITE

Ark, crafted by the late Candelario Medrano, of painted earthenware, from Mexico, ca. 1975. Medrano, one of Mexico's greatest figural ceramists, combined bright colors with traditional folk forms to produce exciting decorative objects such as this ark, made for sale outside the region.

Weaver, Ecuador, 1990. This rebozo weaver is setting up warp threads for dyeing. This process a form of ikat (a technique in which warp yarns are tie-dyed before weaving), has its roots in pre-Hispanic Andean society but also shows strong influence from Spanish colonial trade with the Orient.

THE NATURE OF LATIN AMERICAN FOLK ART

Folk art is a visual manifestation of Latin American culture — culture that is, among other things, society's way of dealing with problems that arise in its physical, social, or spiritual environments. It is an individual's community-sanctioned buffer against the environment in which he or she lives. Clothing, for example, is a response to the demands of the physical environment. Special clothing used to mark an individual's passage from one stage of life to another, however — a wedding dress or a burial costume — is a cultural response to the social worlds in which Latinos live. Similarly, the offering of a votive object to a favor-

LEFT
Trunk, artist unknown. Wood, from Nahuala, Guatemala, ca. 1930. The Indians of highland Guatemala have a long tradition of wood carving. This trunk, made to store household possessions, is decorated with a curious blend of native and European motifs, the jaguar and the two-headed eagle, respectively.

CENTER
Stirrups, artist unknown. Wood and metal, from Ecuador, ca. 1910. The form of these interesting stirrups from the beginning of this century goes beyond utilitarian necessity. The dog motif may have its origin in the early colonial period when Spaniards brought ferocious mastiffs to attack and terrorize the Indian population.

ite saint (a tin painting, for example) seeks to reduce the vertical distance between a believer and the spiritual world, and is a cultural response to that mysterious environment.

Folk art is plastic and malleable, always changing, sometimes radically, to meet the needs of the societies that make and use it. In this sense, it is a coping mechanism. The traditional wood-carvers of the valley of Oaxaca, Mexico, who once created special images to appease a powerful saint in whose hands rested the region's future, now whittle exotic animals for export in response to a collapsed economy and runaway inflation. Toy makers from Merida, Venezuela, who once spontaneously crafted dolls and other playthings for the children in their neighborhoods, now make them for sophisticated markets in Caracas, Santa Fe and Paris, adjusting to the economic reality in which they live with the only tool at their disposal — traditional folkways.

All art, but especially folk art, has two important components. One is the formal aspect: the aesthetic qualities of texture, color, and shape. The other is meaning: how and why an object exists and the context in which it is found. To understand Latin American folk art, one must pay close attention to both. Octavio Paz has written that the beauty of folk art objects "is inseparable from their function: they are handsome because they are useful. Handicrafts belong to a world existing before the separation of the useful and the beautiful . . . utensil, talisman, symbol: beauty was the aura surrounding the object, the consequence — nearly always involuntary — of the secret relation between its making and its meaning." With Paz' comments in mind, the folk art of Latin America can be divided into four broad functional categories — strictly utilitarian, ceremonial, recreational, and decorative. The first category is composed of pieces that are closest to Paz' utilitarian core, and the other three stray from that parentage to varying degrees.

Strictly utilitarian objects are those made to satisfy the daily practical needs of those who produce and use them. Carefully hand-woven clothing, household furnishings, work implements, cooking utensils, and other utilitarian objects are still found in great abundance throughout Latin America in spite of their rapid replacement by mass-produced objects, which are divorced from local tradition. While largely utilitarian considerations are at the heart of this category, few artists are content to let their imaginations and skills rest there. Folk artists in Latin America, as elsewhere, creatively seek to satisfy the dual roles of pragmatism and embellishment. Without disturbing the forms that closely follow their functions, inanimate objects are often transformed into human and animal shapes. Practical stirrups from Ecuador bear ferocious faces of dogs; Peruvian chicha vessels assume the semblance of llamas; sturdy walking sticks from the highlands of Guatemala are entwined with

alternating vines and serpents, and functional shoeshine boxes from Bogotá are transformed into gaily painted buses.

Ceremonial folk art, both secular and religious, is the most visible and dramatic form of folk expression in Latin America. Using traditional objects loaded with symbolic meaning, people all over Latin America commune with their saints, maintain continuity between the living and the dead, acknowledge the passage from one stage of life to another, and strengthen ties with family, community, and nation. Occasions recalling important secular events, such as popular dates of historical incidents related to the foundation of nations, states, and communities, and those staged to honor the deeds of armies and their leaders, yield colorful parades and reenactments through various forms of visual and performance arts.

Most ceremonial folk art, however, is religious. All over Latin America, there is a sacred geography, known mainly to the faithful, and it is at these holy places that religious folk art comes into play in a vital way. Sacred caves and mountain tops in Mexico and Peru, dusty pilgrimage centers in Brazil, quiet family altars in Guatemala, silent graveyards in Ecuador, quaint churches in rural Argentina, and voodoo huts in Haiti all share one thing in common: for those who believe, they are the sacred arenas where the constant dramas of life and death, sickness and health, and hope and despair are played out according to local traditions, some of which are thousands of years old. Usually, these rituals are part of Latin American folk religion associated with the Catholic church, especially in honor of the saints. Throughout a village's ritual calendar, there may be as many as a dozen saints honored annually through traditional ceremony, much of which calls upon folk art to provide visual proof of spiritual dedication. Home altars are constructed to appeal to the tastes of individual saints whose favors are being curried, giant kites are flown above graveyards honoring not only ancestral spirits but the community's patron saint, and masked dance dramas, hundreds of years old, are performed in front of images of sacred entities who hold in their hands the well-being of the community.

At the heart of most religious folk art in Latin America is the concept of *la promesa*, a vow between a believer and members of the spiritual world who hold sway over individual, familial, and communal destiny. This contract is based on reciprocity, and always one's prayers are answered with strings attached, i.e., the fulfillment of a vow such as undertaking a lengthy pilgrimage, or by offering votive objects. For example, *milagros*, small votive objects that are testaments to a saint's effectiveness, are found all over Latin America and are placed on altars in fulfillment of a *promesa* or vow. Small silver eyes, wooden breasts, and legs testify to a saint's healing powers. A model wooden shrimp boat

RIGHT

Ex-votive "milagres", artists unknown. Wood, from Brazil, ca. 1990. "Ex-votive" refers to the object's status as one that has already been offered to fulfill a vow. In Brazil, ex-votive objects are frequently made of wood, often in actual size rather than miniature. Each year hundreds of thousands of pilgrims deposit "milagres" ("miracle" in Portuguese) such as these at popular shrines in appreciation of miracles received. Once they have been accepted, their sacred status changes to secular. Every few months they are removed and destroyed.

Jacinto Rojas and son, Mexico City, Mexico, 1989. Rojas, an itinerant photographer who painted backdrops — including some designed for use at the Shrine of Guadalupe — learned his craft from a younger brother. The late artist's son continues the tradition he learned from his father.

ABOVE RIGHT
José de Los Santos, woodcarver, Merida,Venezuela, 1989. The mountainous region around Merida is well known for its active wood carving industry. José de Los Santos has carved most of his life, producing a wide variety of objects for religious and secular use.

OPPOSITE LEFT
José Belandria, woodcarver, Merida, Venezuela, 1989. Belandria heads one of Venezuela's best known woodcarving families. His works include popular saints, figures of Simon Bolivar, and kinetic toys, which he colors with crayon.

hanging in the chapel of a village in southeastern Mexico, offered by fishermen caught in a storm at sea, testifies to the miraculous intervention of San Francisco de Asis. All of these objects are visual proof of faith, and shorten the vertical distance between the devout and the powers in which they believe. In return, saints are also expected to be responsive. In Guatemala, Puerto Rico, and other parts of Latin America, if individual sacrifices go unanswered, images may be scolded or have their faces turned toward the wall as punishment.

Ceremonial folk art can also be seen in the many performances each year associated with carnival, saints' days, and other special days in the Christian calendar. Dance groups are organized, practice rigorously throughout the year, and make pilgrimages to specific centers in order to give thanks for favors received or to curry the favors of particular saints. Masks and giant carnival figures play central roles in these dance dramas, and their variety is limitless.

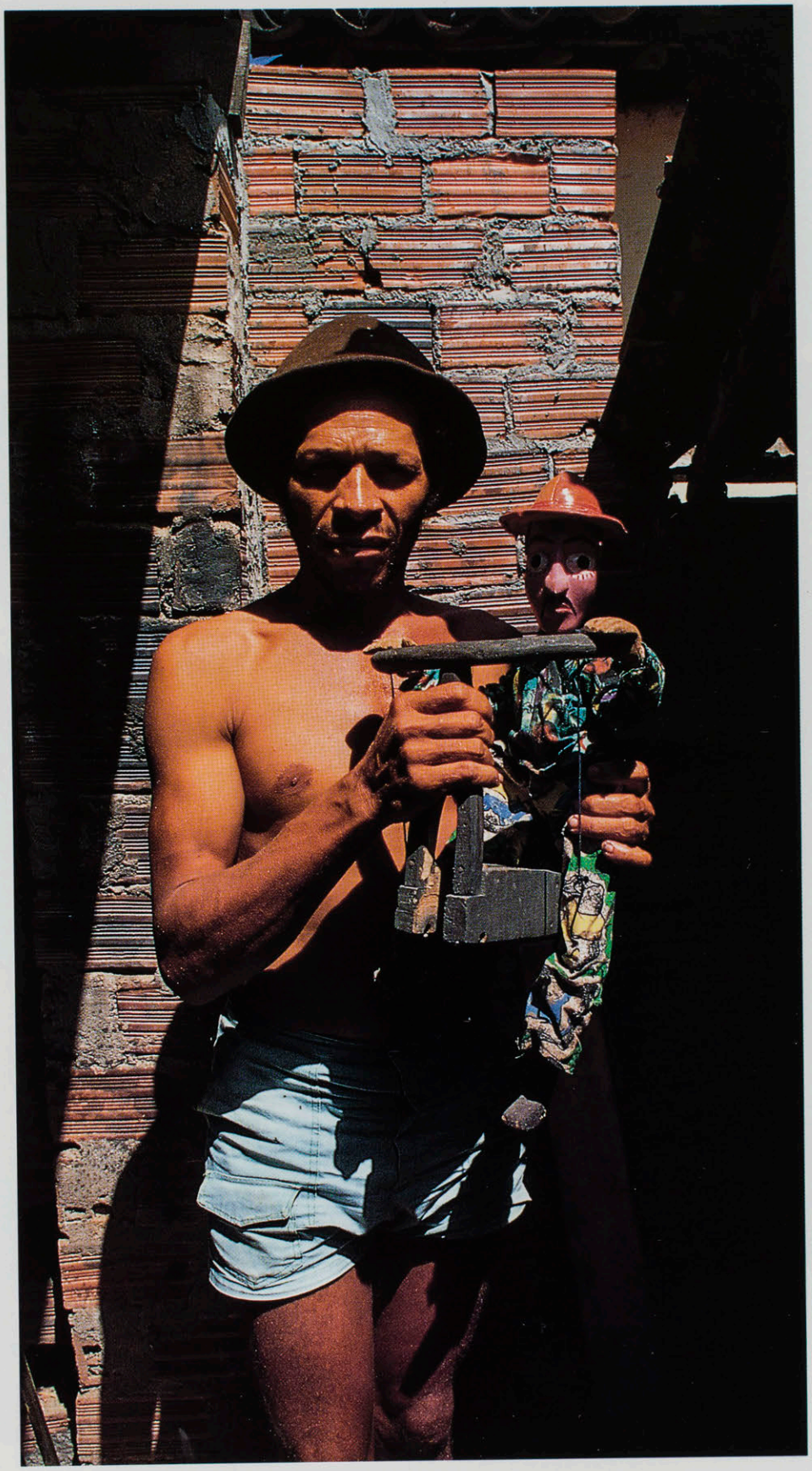
Ceremonial folk art provides us an opportunity to look at the very soul of Latin America and an occasion to explore the fundamental beliefs of those who include it in their lives.

Recreational folk art encompasses objects whose primary function is to entertain and amuse. Consisting mainly of toys, dolls, games, and miniatures, this folk art allows the maker and the user to escape the world of the mundane and enter the domain of dreams and fantasy.

Many Latin American toys and other forms of recreational folk art operate on several levels of meaning, not always immediately apparent. On the surface, they appear to be lighthearted and whimsical objects of play. Beneath the surface, however, they frequently tell another, equally important, story. Toys, especially miniatures, often serve as key agents of socialization. Boys and girls are given toy farm tools and dolls, respectively, to encourage play that prepares them for adult tasks that lie ahead. Games, such as *loteria*, are often more than mere entertainment; they may provide a chance, albeit slim, for people to expand their fortunes in a manner that is not threatening to friends and neighbors.

The last category of Latin American folk art might be called more or less purely decorative. Although a strong indicator of local tastes and preferences, the primary function of decorative folk art is to adorn the body, the home, or some other area. In contrast to other categories of folk art, the forms of these objects do not necessarily follow their function, though they remain grounded in and bound by traditions of the folk artist's culture. The elaborate ceramic arks by the late Candelario Medrano, for instance, are an example of purely decorative folk art: although they maintain the basic lines of a boat, they are made of unseaworthy material and produced exclusively for decorative use.

BELOW RIGHT
Sauba, Master Toymaker, Carpina, Brazil, 1990. An intense artist who makes toys, puppets, and carnival costumes for himself, his neighbors, and shops in nearby Recife, Sauba draws his subject matter from Brazilian folklore, which he promotes energetically.

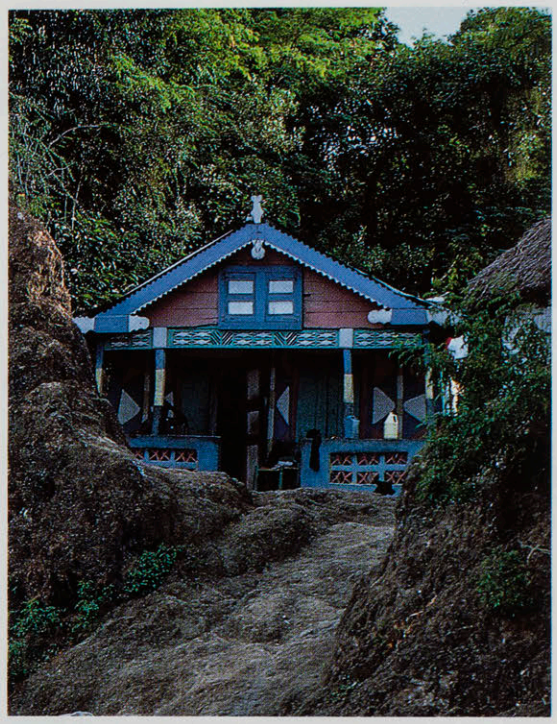


FOLK ARTISTS — THE CARETAKERS OF TRADITION

Latin American folk artists are young and old, male and female, Indian and non-Indian. They live in noisy cities, busy regional market towns, sleepy coastal fishing villages, and thousands of small, semi-isolated farming communities all over Central and South America. Most barely manage to make ends meet, but in spite of their relatively low economic status, folk artists are held in high esteem by their neighbors because they are seen as vital links between the past and the present and are looked upon as the caretakers of traditional life.

Many folk artists are part-time specialists who spend most of their time performing duties not related directly to folk art production. Some are peasant farmers who spend their days in the fields. Others work as housewives, carpenters, tinsmiths, brick masons, herdsmen, and in other occupations. One part-time folk artist is Roberto Rivera, a fireman who lives in Corozal, Puerto Rico, a small town just outside of San Juan. He is also a *santero* and represents the fifth generation of the Rivera family to carve wooden saints in a traditional fashion. Each day he takes to work with him a small portable box containing his tools and pieces of care-

Village church, San Andres Xecul, Guatemala, 1991. Throughout Latin America the church is the symbolic core of the community. This extraordinary 18th century church is gaily decorated with painted stucco relief carvings and is the pride of San Andres.



RIGHT

Rural hut, Haiti, 1989. Peasants in rural Haiti still paint and carve the facades of their huts with colors and symbols associated with voodoo.

fully selected wood. While his colleagues play cards or watch television, he works on popular religious images that he sells to tourist shops in Viejo San Juan or to neighbors for their home altars. His production is small and only allows him to augment his fireman's salary in a modest way, but he derives tremendous pleasure from being a part-time *santero*, through which he keeps the family tradition alive.

Many folk artists specialize in one particular area such as ceramic figures, or carved animals, but others are amazingly broad in their interests and skills. Sauba, an eccentric artist from the northeast Brazilian town of Carpina, is a jack-of-all-trades and makes a wide variety of folk objects, ranging from puppets to wooden and cloth horses that are strapped around the waists of carnival revelers. He also makes complex kinetic toys, some blatantly erotic, which would be envy of Rube Goldberg.

Throughout Latin America there is usually a strong sexual division of labor among folk artists. Women who care for children and maintain the household while their farmer husbands work in the fields often engage in activities such as pottery production and weaving, both of which can be carried out within a family's courtyard. In most parts of Indian Latin America, women have always woven on back-strap looms, but in communities where Spanish upright looms are used, weaving is done more frequently by men. In the Nahua community of Zacualpa, Mexico, pottery production is shared

Masked dancers, Tabasco, Mexico, 1989. Each year around August 15, dance groups in Tabasco celebrate the Day of the Assumption of the Virgin. Some dramas are historical; others are morality plays. All are performed to please the Virgin in whose hands rests the well-being of the community.

Santiago Matamoros nicho, artist unknown. Polychromed wood and metal, from Bolivia, ca. 1950. Originally designed for a home altar, this niche shows Santiago as defender of Christianity. Although Santiago came to the Americas as the patron saint of the conquest, his tremendous powers immediately impressed the Indians, who quickly adopted him as their own and assigned to him new attributes to meet their needs.

< Chicha vessel, artist unknown. Earthenware, from Peru, ca. 1940. Chicha is a corn beer popular throughout the Andes. When it is consumed ritually, it is often drunk from specially formed containers such as this llama.

by both sexes, but certain tasks are performed exclusively by one or the other. Zacualpan men gather the clay and wood for firing, and the women do the actual forming, burnishing, and firing. Both men and women take pottery to market to sell.

Latin American folk artists learn their art from a variety of sources. Many learn from parents or grandparents, and others serve lengthy periods of apprenticeship under village masters. Still others are self-taught. The late Jacinto Rojas, an itinerant photographer and painter of backdrop scenes, learned to paint from his younger brother, Enrique. When his brother died prematurely from alcoholism, Jacinto took over the business full time. For years he painted backdrops for itinerant photographers all over central Mexico, and his charming paintings can still be seen at the Villa de Guadalupe, Alameda Park, Xochimilco, and other popular spots in and around Mexico City. Juan de Dios Riojas, the grown son of Jacinto, started an apprenticeship with his father at the age of fifteen and continues to carry on the family tradition begun by his uncle.

Folk artists receive their calling in different ways. Jose Francisco Borges, the Brazilian folk poet and graphic artist, started out selling cheap pamphlets, called chap books, on market day by singing songs related to the folk tales they contained. Later, he realized that if he could make the wood print images on the covers of these popular books, he would be able to produce the pamphlets himself, cutting his costs considerably. Today, he is one of Brazil's most illustrious folk artists, and he makes a wide variety of chap books and other graphics that are sold locally or to foreign collectors and museums.

Although traditional folk artists in Latin America seldom sign the objects they make, their works are by no means anonymous to other folk artists nor to those who buy and use them. Usually, members of an artist's community are able to identify which hands made which pieces. The shape of a pot handle, the facial features of a carved image, the color combination of a weaving — all provide clues to authorship. Among neighbors and clients, folk artists develop good or bad reputations, depending, of course, on the degree to which their works stand up to the standards established by the community itself. A folk artist's main critics are usually neighbors with whom the artist relates on a day-to-day basis.

Folk artists all over Latin America serve as keepers of tradition and links between the past and the present for themselves, their families, and their communities. They extend this function by serving as brokers between their communities and the outside — by representing traditional community values to the world through their vital creations.

Decorated grave, Sumpango, Guatemala, 1988. All Souls' Day is celebrated all over Latin America, and each region has its own special form of expressing respect for the dead. In Sumpango, cemeteries are cleaned and graves brightly decorated with marigolds and other seasonal flowers.

Dr. Marion Oettinger, Jr. is Curator of Folk Art and Latin American Art at the San Antonio Museum of Art in San Antonio, Texas. All photographs are by the author. This article has drawn heavily from the author's recent exhibition catalogue entitled The Folk Art of Latin America: Visiones del Pueblo *(New York: Dutton Studio Books, 1992), in which a bibliography may be found. The exhibition* Visiones del Pueblo: The Folk Art of Latin America *will be displayed in the Natural History Museum Foyer from October 30, 1993 through January 5, 1994.*

The Vanishing Desert

Photographs by Pamela S. Roberson

OPPOSITE
Sand dunes in Death Valley at Stovepipe Wells, looking north toward the White Mountains.

A LARGE PORTION OF THE TERrestrial globe, about one-fifth, is naturally desert or semi-desert — arid ecosystems formed by interaction between topography, global air circulation, and ocean currents.

The portions of the Mojave, Sonoran, and Great Basin deserts found in California comprise the "California Desert," one of the largest unbroken wildlands remaining in the continental United States. Its 25 million acres — almost 40,000 square miles — cover nearly one quarter of the state. A land of stunning beauty and diversity, the California Desert contains jagged mountains and hollow canyons, wind-sculpted sand dunes and lush oases. Within its perimeters are the White Mountains' snowy peaks and Death Valley's Badwater Basin, the lowest point in the western hemisphere and one of the hottest in the world.

By geologic standards, it is a young desert; only in the last 5,000 to 8,000 years have extreme hot and dry conditions set in. Yet in that relatively short time, plant and animal species have adapted to keep pace with the changing climate. There are two-inch-long fish that thrive in warm, salty pools; birds that hibernate; rodents that never drink; shrubs that send tap roots down 100 feet to find moisture; and toads that develop in one of the fastest vertebrate maturation sequences known, timed to take advantage of the desert's uncertain rains.

A sidewinder *(Crotalus cerastes)* moves through the Eureka Dunes.

Within its perimeters the desert harbors some of the world's oldest living things — bristlecone pines and creosote bush rings, and it contains some 500 species of vertebrate animals, nearly twice as many plant species, and thousands of insect species.

The desert also meets the demands of humans: its precious metals are mined, its wind energy harnessed, its valleys irrigated for crops, and its vast open spaces explored by off-road vehicle riders and tourists. Our use, however, threatens the desert's wildlife and alters its landscape. Despite its barren look, the desert abounds with life, and the balance is delicate.

THE DUNES

Built of windblown deposits carried from dry lake beds and washes, sand dunes appear deviod of life, but they support surprisingly ample wildlife communities. More than 50 species of plants live in the Eureka Dunes north of Death Valley, and over 80 species of vertebrates and even more insect species frequent the Algodones Dunes, California's longest continuous dunes. These include kangaroo rats, horned lizards, ground snakes, jack rabbits, wingless cockroaches, burrowing beetles, and others. The Colorado fringe-toed lizard can live only in loose, windblown sands, diving and then "swimming" short distances under the sand when pursued.

The desert may seem empty, but many animals hibernate through winter's coldest months, and retreat in summer to cool, moist burrows below the desert floor, emerging only at dusk. The Andrews scarab beetle, which lives only in the fine sands of the Algodones Dunes, spends most of its life in the damp layer as deep as a foot underground, except for a month during which swarms of adults emerge for a few minutes at twilight to mate.

The succulent flower stalk of the rare, parasitic plant called Sand Food (*Ammobroma sonorae*), which grows only in the dunes and washes of the southwestern U.S. and northern Mexico, was both a delicacy and a thirst quencher for Native Americans living in the desert. Highly adapted to the desert heat, its fleshy parts store considerable quantities of water and can grow more than four feet in length, from the root zone to the sandy surface where the flower head emerges. As many as eight plants may branch from the root system of a single host shrub. The plant is considered rare and endangered by the California Native Plant Society.

WATER AND PLAYAS

About 10,000 years ago, the California desert region was laced with an elaborate web of lakes and streams, fed by the rains and melting ice fields of the Sierra Nevada and other high ranges. The rushing Amargosa River flowed into a lake on the floor of Death Valley, and the Mojave River's plentiful waters emptied from the San Bernardino Mountains into scattered lakes.

Today, isolated pockets along these old watercourses contain remnants of a cooler, moister past. Along rocky streams and at spring-fed pools and oases are canyon treefrogs, red-spotted toads, Pacific pond turtles, stream orchids, and maidenhair ferns.

Dry lakes, called playas, once brimmed with water hundreds of feet deep. Now they are salt- and mineral-encrusted flat pans, barren except where there is enough ground water to support a sparse growth of salt-tolerant plants.

Safely encased in the sun-baked mud of some dry lake beds are millions of minuscule fairy shrimp eggs. Drought-resistant, they can survive for years, even decades, in the mud, waiting for rain. As the playa fills during a storm, enormous numbers of eggs hatch, and dainty, translucent freshwater shrimp appear. They hatch, mature, mate, and lay eggs within about 15 days. By the time the water has evaporated, the adults are dead and the next generation's eggs are securely stowed in the cracked mud, awaiting the rain to trigger another cycle.

Populations of tiny pupfish, isolated as waterways dried up, have adapted to extreme environmental conditions. One species tolerates water five times saltier than sea water; another tolerates temperatures that fluctuate from hot to freezing. Another lives in extremely shallow water. One entire species, the most restricted vertebrate species known, exists in the shallow pool of a limestone cave in Ash Meadows, Nevada. Another such species, the Tecopa pupfish, was confined to a single pool near Death Valley. It became extinct when the underground springs that fed the pool were diverted to bath houses in the 1940s.

HUMANS

Once, the California desert was a remote wilderness. Today, about half a million people live there, and more than 16 million inhabit the coastal cities encroaching upon the desert's western perimeter. The desert contributes to their supplies of water, power, energy, and food, and is a source of recreation. Power plants such as one near Barstow track the sun's path across the sky and reflect its beams to a central tower where steam is produced and electricity generated. Thousands of wind turbines scattered in the northern Coachella Valley generate electricity by harnessing the steady winds that blow through the San Gorgonio Pass.

Water, the desert's most precious resource, supplies taps, swimming pools, and gardens for the growing population pressing at its back door. A pair of massive aqueducts carries water across the desert to supply the Los Angeles Basin, one of them draining lakes and streams hundreds of miles north to dangerously low levels. The parched bed of Owens Lake is the source of about ten major dust storms a year whose detritus sometimes covers an area of more than 55,000 square miles.

Among the first human inhabitants of the desert were nomadic bands of hunters and gatherers, who were established in the region some 11,000 years ago. Ancient reminders of their communities — stone flakes, cooking hearths, pottery, grinding stones, and mortars — are scattered throughout the desert in what archaeologists estimate to be more than 100,000 sites. At the northern edge of the Mojave Desert are thousands of petroglyphs — the oldest estimated at 6,000 years — depicting bighorn sheep, hunters carrying bows and arrows, and abstract geometric designs. Intaglios — giant prehistoric figures made by people who removed desert pavement rocks to expose light soils underneath — are now protected by federal law from scarring and destruction by vehicles and vandals.

In the waning months of 1849, the first wave of gold seekers looked across Death Valley for a short cut to the California gold fields. A few decades later, the first railroads were built, bringing miners and stockmen to the Mojave. By 1910, desert valleys were irrigated for farming; today the Imperial Valley is the nation's winter vegetable garden. Farming in the desert sometimes means tapping deep into the water table or into aquifers where fresh waters have accumulated over thousands of years. In some areas, these ancient waters are approaching critically low levels.

Domestic sheep and cattle have grazed the California desert for 100 years. Where their use is heavy, the diverse wildflowers and native grasses upon which many indigenous animals depend are displaced by introduced weeds. Streambeds are trampled, shallow burrows are destroyed, young tortoises are crushed, and the desert's fragile erosion-resistant crust is damaged.

LEFT
Creosote bushes *(Larrea tridentata)* growing in a salt-encrusted flat pan in Death Valley near the Stovepipe Wells Dunes. No living thing on the North American desert floor is more commonplace or more ancient than the creosote bush, and nothing is more critical to the desert's delicate web of existence. This pungent, drought-resistant plant grows in sandy dunes, dry valley floors, on arid rocky slopes, and in the vast lowland basins across the Colorado and Mojave Deserts.

Animals seek out the creosote for shade; hidden in its foliage are long-tailed brush lizards camouflaged to match its slender gray branches, praying mantises, grasshoppers, and ants. Its dense roots anchor loose soils, supporting elaborate burrows and underground runways for pocket mice, lizards, ground squirrels, spiders, desert tortoises, and colonies of kangaroo rats.

The Cahuilla and other Native American tribes boiled creosote twigs and leaves for medicinal teas, crushed its leaves into powder to treat colds and stomach cramps, and made hot compresses of its leaves to heal wounds.

When moisture is available, the creosote absorbs all it can. Its waxy, resin-coated leaves seal in moisture and reflect light. When drought sets in, the creosote cuts back drastically on its needs, shedding leaves and branches to reduce evaporation until the drought breaks. Able to monopolize much of the moisture from the ground area within its perimeter, it leaves little for competing plants.

Dunes near Stovepipe Wells
in Death Valley.

Dunes at a military testing site east of Anza-Borrego Desert State Park.

Today more than 50,000 acres of the California desert are actively mined for some 25 minerals that produce almost $1.5 billion annually. Ninety-seven percent of the nation's rare-earth elements — used in nuclear research, fiber optics, electronics, and gasoline refining — come from the desert. More than 80,000 mining claims exist in the desert, most for gold. New techniques for recovering gold dust from ore have helped support the desert's 14 operating gold mines, seven of which are heap-leach pit mines that often occupy hundreds of acres, require an average of 16 tons of rock to produce one ounce of gold, and leave stadium-sized pits in the ground. Mining companies must replace topsoil and re-seed bare hills after mining a deposit to completion, but this process has not proven successful.

In the 1950s, the aircraft industry came to the California desert, whose clear skies and wide open spaces made perfect flight-training grounds. Now more than three million acres is set aside for military use. Space probes are launched, tank troops are trained, missiles are developed and tested, and the space shuttle lands in the Mojave. Twenty-nine Palms is the largest Marine base in the U.S., and military use of the desert is expanding.

Gunfire, flyovers, and other maneuvers affect desert wildlife in the naturally quiet habitat. Many animals have acute hearing, a common adaptation that allows them to hear both predators and prey. The kangaroo rat, for example, has hearing so sensitive that it can detect the slithering of a sidewinder. High intensity sound damages the hearing of many desert animals.

Tracks gouged into desert soils disturb the thin crust that seals moisture below the dry surface. Vehicle tires compact the soil, making

growth difficult for native annuals and introducing seeds of weeds with which the native plants, which evolved in the absence of invasive vegetation like weeds, cannot compete. The thin crust of the surface is slow to heal. Sometimes the record of past events is still visible centuries later: prehistoric art, prospectors' wagon wheel trails, Gold Rush mine tailings, and the tracks left behind by General George Patton's 1940s elite tank corps, training for war in North Africa.

The desert's past is an ancient one, but its future is uncertain. Its habitats are shrinking, destroyed by ranches, mines, farms, power plants, housing complexes, and off-road vehicles. Its precious minerals and underground water resources are not inexhaustible. Many of its wild lands have been scarred by over-use; violent dust storms are increasingly common, and some wild habitats no longer support the diverse life that once thrived there. The numbers of desert species that are threatened or endangered rise each decade.

We have barely begun to know the California desert. Wildlife biologists continue to discover new species, including a land-dwelling lungless salamander found in 1973 whose ancestry may reach back 40 million years; a previously unknown species of wild buckwheat discovered in 1975; and a new species of toad found in 1987. Hundreds of other desert organisms are probably still undiscovered. Many hover near extinction and could disappear before we know them.

Spring agave shoots *(Agave deserti)* reach for the sky in Anza-Borrego Desert State Park. These inflorescences, which can grow a foot overnight, reach heights of over three meters (10 feet).

< Soldiers practice maneuvers at Twenty-Nine Palms Marine Base north of Joshua Tree National Monument.

The Desert Tortoise: The Barometer Species

THE LUMBERING DESERT tortoise, California's state reptile, once roamed the lowland basins of the Mojave and eastern Colorado deserts. Its lineage reaches back some 12 million years in California, but in the last half century, its numbers in the western Mojave dropped an estimated 90 percent, with the biggest decline in the last 10 years. Now, with human expansion into the desert, only sparse remnants of the tortoises' populations persist in their former Mojave and Colorado Desert habitats.

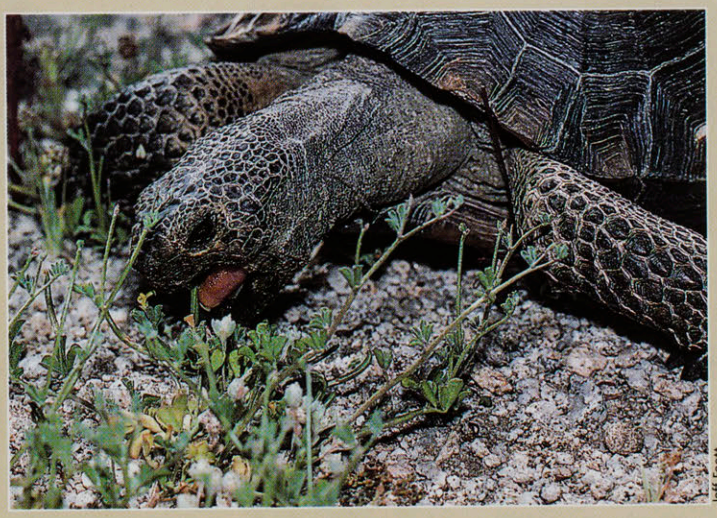
A dramatic surge in the desert's raven population, apparently linked to increased human activity, poses a serious threat to the tortoise population. Young tortoises fall prey to ravens, who drill the soft shells with their powerful beaks.

Unlike most other desert reptiles, tortoises are vegetarians. When they emerge from hibernation in spring, nearby areas have often been grazed by sheep and cattle, which eat the same annual wildflowers and grasses that tortoises eat.

A contagious upper respiratory disease that plagues pet tortoises reached epidemic proportions among wild tortoises in the mid-1980s and has brought many populations to precariously low levels. It may have been spread when diseased pet tortoises were released into the desert.

Desert tortoises, whose burrows also shelter snakes, lizards, rodents, and burrowing owls, and which themselves serve as food for the kit fox, coyote, bobcat, and golden eagle, are a "barometer" species. When they thrive, so does the desert. Now the tortoise, once the very symbol of the wilderness in which it lived, has become the symbol of the vanishing desert.

Jeff Foott



Jeff Foott

Jeff Foott

ABOVE

Desert tortoises (*xerobates agassizii*) rely on the protection of shallow burrows they dig using powerful forelimbs with long, thick claws. Their burrows are often up to 12 feet long. Vegetarians, they compete with livestock for forage.

LEFT

Ravens, who hammer into the soft shells of young desert tortoises with their powerful beaks, account for half of all juvenile tortoise deaths in the western Mojave and perhaps one quarter of all tortoise deaths in the Colorado Desert.

Burrowing Life

THE DESERT APPEARS SILENT and empty until cars, campers, and motor homes arrive, but scattered across its valleys, hillsides, and dunes are millions of the burrows to which most desert animals retreat in the heat of the day.

Burrows come in a variety of shapes, sizes, and depths, but many are less than a foot below ground. Scarab beetles and horned lizards bury themselves near the surface or under leaf litter. Desert iguanas, snakes, and whiptail lizards wiggle into shallow burrows. Couch's spadefoot toad burrows in loose soils; desert tortoises spend more than half their life underground. Most lizards and snakes use burrows already dug by other animals.

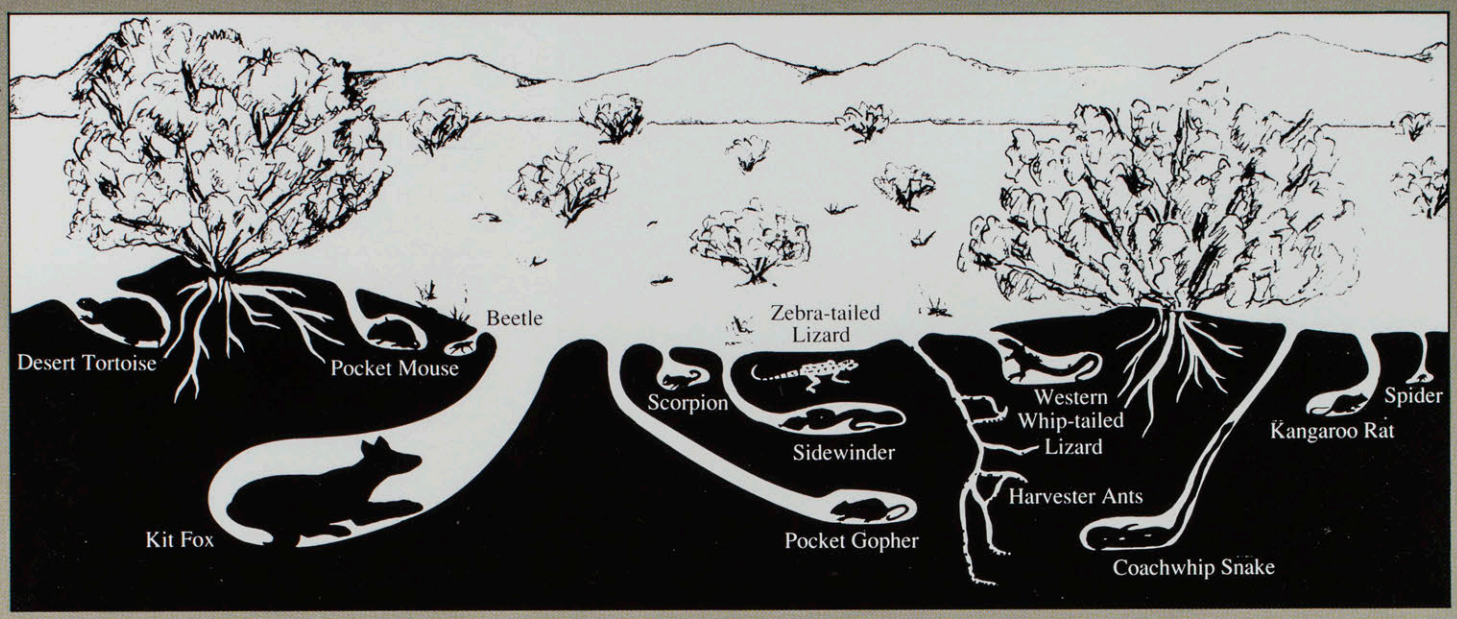
When dirt bikes or dune buggies blaze trails across the desert flatlands or scramble through washes and across dunes, only inches separate their powerful tires from the animals below. Even highly territorial animals will abandon their homes when vehicles intrude, and often they do not survive in new territory. They face established rivals and have difficulty finding food and retreats, making them easy targets for predators.

BELOW

These two views show the route of the Kern River natural gas pipeline before and after its construction on the north side of the Clark Mountains. Plans to restore joshua trees, yuccas, and cacti to the site were never carried out.

Howard Wilshire

Howard Wilshire



California Academy of Sciences

Most desert animals retreat to burrows in the heat of the day.

Howard Wilshire

Although the desert appears to be rugged, its landscape is one of the most easily scarred in the world. Since the late 1960s, motorcycles, dune buggies, and all-terrain vehicles have found their way to the desert by the tens of thousands. The high-intensity squeal of one revving motorcycle engine can carry two miles, damaging animals with acute hearing adapted to the quiet desert environment. A two-wheeler scaling a hillside gouges deep ruts in the surface, stripping plant life and crushing burrows occupied by lizards, tortoises, mice, and insects resting inches below the surface. Even one pass of a dune buggy's tires can destroy the delicate crust that regulates moisture and prevents erosion, laying the way for chronic dust storms, wind and water erosion, and the onset of increasing aridity.

This motorcycle is ascending a steep hill in Jawbone Canyon in the northwestern Mojave Desert, in an "open area," defined by the Bureau of Land Management as one where vehicles are permitted to do anything of which they are capable. Gouges, exacerbated by denudation and erosion, have reached bedrock in the upper two-thirds of the slope.

Pamela Roberson

Death Valley.

Photographer Pamela Roberson lived for five years in the Shouf Mountains of Lebanon with the secretive Druze sect and has shot assignments in 60 countries, but she is most renowned for her personal abstract depictions of desert landscapes. Her work has been featured in museum and gallery exhibitions throughout the world. Her latest book, with journalist Richard Bangs, is Island Gods, *published in 1991 by Taylor Publishing Company, Dallas.*

This article was compiled by Ann Seaman from information in the exhibit The Vanishing Desert, created by the California Academy of Sciences. The exhibit will be in the Director's Gallery at the Natural History Museum from May 1 through July 25.

The editors thank Howard Wilshire and Robert C. Stebbins for their contributions of information and photographs in sidebars to this article, and Jeff Foott for his contribution of photographs in the desert tortoise sidebar.

For More Information

LARGE SECTIONS OF THE California desert have been set aside as wilderness areas, giving them the highest order of preservation and protection. Others are set aside as preserves to conserve and study threatened species. The California Desert Conservation Area is managed under a variety of state, federal, and local laws. No single law provides long-term management for the desert as a whole. Bills representing visions for the desert's future are before Congress. Congressional representatives have information on these bills; following is a list of organizations that have information on desert issues.

The Sierra Club, 3345 Wilshire Blvd., Suite 508, Los Angeles, CA 90010. Phone: 213/387-6528

The Desert Protection Act's primary non-governmental backer, instrumental in the formation of the act.

California Desert Coalition, 6192 Magnolia Ave., Suite D, Riverside, CA 92506. Phone: 714/ 684-6509

A non-profit umbrella group organized in opposition to the Desert Protection Act. Its members include city councils, boards of supervisors, military organizations, private property interests, off-road vehicle user groups, and mining and business interests.

California Off-Road Vehicles Association (CORVA), 1024 P St., Suite 1, Sacramento, CA 95814. Phone: 800/422-6782

The nation's largest organization of off-road vehicle users, CORVA lobbies against the Desert Protection Act and occasionally publishes materials about desert legislation.

Robert C. Stebbins

Bristlecone pines (*pinus longaeva*) in the White Mountains. Groves of limber pine and other conifers cling to the peaks of the Clark, White, and Panamint Mountains. High above the desert floor, these moist, cool habitats are like islands — relics of a time when the desert's mountains were extensively forested and the entire region was somewhat cooler and wetter. Remnant populations of animals survive on these moist mountaintop zones, which are so isolated from each other that some species of insects, once identical, have evolved separately and now differ from one range to the next.

Fossil seed and plant fragments from woodrat nests indicate that the Clark Mountains have been continuously covered with stands of white fir for some 28,000 years. Woodrats collect almost anything portable and will use the same nest for thousands of generations, and thus their nests present an excellent record of vegetation changes over time. Radiocarbon dating has placed the age of a nest in the Clark Mountains at 28,000 years and another in Nevada at 40,000.

■ *Desert Protective Council*, POB 2312, Valley Center, CA 92082. Phone: 805/942-3662

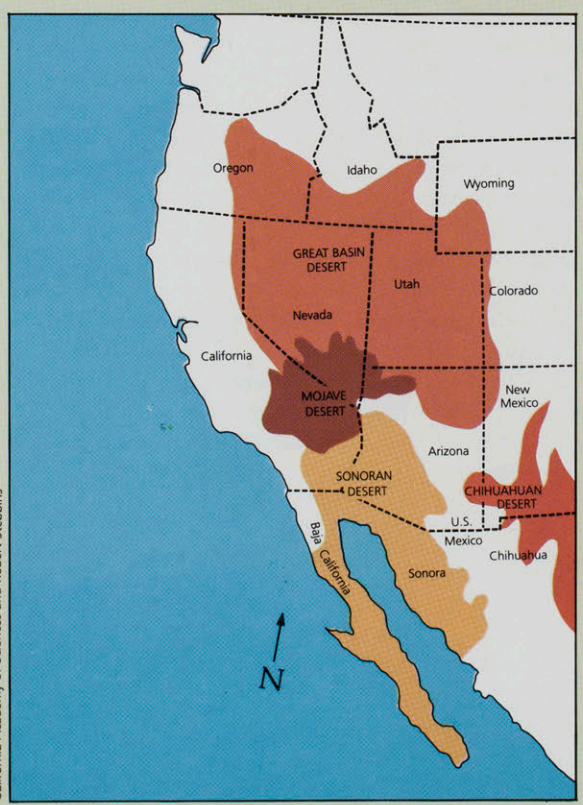
An organization formed in the late 1950s to address desert conservation and related issues; strongly advocates passage of the Desert Protection Act.

■ *The Wilderness Society*, 116 New Montgomery, Suite 526 San Francisco, CA 94105. Phone: 415/541-9144

An organization dedicated to wilderness conservation nationwide and a primary backer of the Desert Protection Act.

■ *U.S. General Accounting Office*, POB 6015, Gaithersburg, MD 20877. Phone: 202/512-6000

GAO's written review of wildlife management by the Bureau of Land Management provides an historical overview of the area and the issues.



California Academy of Sciences and Robert Stebbins

In 1986 Congress defined and named the California Desert Conservation Area, bound by portions of the North American desert found in California. Combined, these three (the Mojave, the Colorado section of the Sonoran, and the Great Basin deserts) form a legislative entity called the "California Desert." Each one, however, has its own character, formed by its own set of biological and physical characteristics.

The Samurai Crab

by Joel W. Martin

Morning arrived cold and gray, with the waves promising more storms to come. It was April, in the year 1185, and the southern Inland Sea of Japan was no place for the meek. Ships stirred restlessly, and troubled voices carried softly across the waters in the small inlet named Dan-no-ura. The Emperor Antoku looked out from his flagship across the sea and knew that his death, and the death of his people, was approaching from the east. For nearly fifty years now the struggle had raged between his people, the Heike or House of Taira, and the warriors known as the Genji, or Miyamoto Clan, from the eastern provinces. At stake was nothing less than total control of the world as they knew it.

Antoku no longer held out any hope for survival. All omens had been wrong. The previous day had seen an enormous school of dolphin approaching his flagship, marked by grey banners with the stylized butterfly logo of the House of Taira. The Royal Diviner had been requested. His prediction: that if the school of dolphin divided and went around the ship, the Heike would survive, but if they dived beneath the waves, so too would the Heike warriors go down in defeat.

The dolphin had dived before even reaching the Emperor's vessel.

Antoku surveyed the scene around him. One thousand ships made up the Heike fleet, and each bore samurai trained for battle. But across the waves, approaching as one with the oncoming storm, were three thousand ships of the Genji. Antoku turned, his very small hands clutching the dove-grey robe that denoted his status, his long black hair moving in the damp wind. Behind him was the nun of the second order, who approached him and wrapped his small body in her own flowing robe. "Grandmother, where are you taking me?" asked the Emperor, to which she replied, "There is another kingdom, beneath the waves . . ." And clutching the boy — for the Emperor was but nine years old — to her breast, she disappeared over the side of the ship, taking with her the last hope of the House of Taira. The subsequent massacre of the Heike was both quick and brutal. None of the samurai survived, and only a few of the wives and consorts were allowed to live, claimed as spoils of battle by the victorious Genji. The war was over. The Heike were no more, and the Genji would rule Japan forever.

OPPOSITE

Painting by Utagawa Kuniyoshi depicting the battle of the Heike and the Genji in 1185, with the defeated Heike samurai turning into crabs as they are thrown from their own ship into the sea. This painting is of interest for several reasons. First, because of the artist's known life span (1797-1861) and because of the stylized nature of this painting, we can assume that the Heike legend was firmly established before the early 19th century. Second, although the artist was familiar with the story, he was less familiar with crabs; the ones in the painting belong to at least two different families, neither of which is the correct family for the true "samurai crab" (*Heikea japonica*). The lateral spines and long claws of the three crabs on the left, clearly different from those on the real samurai crab, place them in the family Portunidae. Crabs closer to the ship are possibly members of the family Grapsidae, as they appear more rectangular and have shorter claws. None of these crabs looks at all like a Dorippidae, the family of the samurai crab.

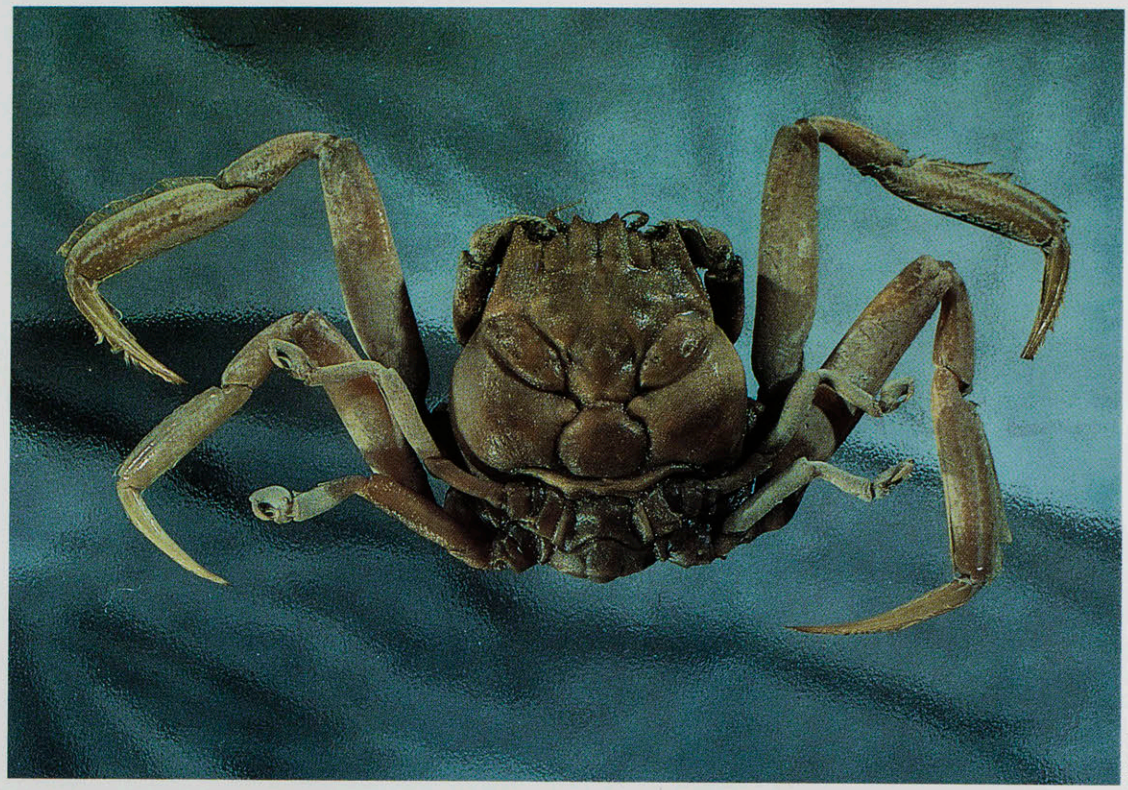
THE ABOVE STORY IS TRUE. There was indeed a large-scale naval encounter in the small bay called Dan-no-ura, southern Inland Sea of Japan, in the spring of 1185 (in some references March, in others April), and the outcome of the battle was a decisive victory for the Genji. More important, though, than establishing the Genji as the ruling party, the battle marked the end of the Age of Courtiers in Japan (A.D. 710-1185), with power transferring from the court aristocracy to the warrior class, and ushering in the age of the military leaders, or shoguns. Called by historians the period of Medieval and Feudal Japan, the shogunate was to last until 1868. History tells us, through several extant versions of the *Heike monogatori* (story of the Heike), that the Genji arrived in a storm and therefore surprised the Heike, that the Emperor Antoku was only nine, that he (or at least his guardian) chose death over defeat, and that those loyal Heike samurai not choosing death by their own hands were thrown into the sea by the conquerors. The events are not difficult to believe; it is the nature of man to war. But the tale has generated other stories that are not true, and they are the subject of this essay.

The first story generated by the events depicted in the *Heike monogatori* is that the Heike still live on the floor of the Sea of Japan. Actually, some survivors of the Heike lineage do survive, and they commemorate in April of each year the battle of Dan-no-ura, and the events that followed the massacre, in coastal Japanese villages. But what lives on the floor of the Sea of Japan and surrounding bodies of water are not people, but crabs. According to the myth, these crabs are the ghosts of the Heike warriors, hideously transformed after their loss and doomed to walk the abyss for all time.

How could such a myth originate? Actually, it is easy to see. These crabs, whose scientific name was until recently *Dorippe japonica*, have a pattern of grooves and ridges on their backs that bear an uncanny resemblance to a human face; more precisely, they resemble the grimacing face of a samurai warrior. These are samurai crabs, known throughout the Orient as *Heike-gani*, the crab of the Heike.

I do not know when this myth first appeared. There is no mention of samurais turning into crabs in the versions of the *Heike monogatori* I have seen. But the legend must be fairly old; although the exact date of the painting depicting this event on the opposite page is not known, the Japanese artist, Utagawa Kuniyoshi, lived from 1797 to 1861. Furthermore, the stylization of this painting indicates that the story on which it was based was not new but had been handed down from previous

Courtesy Dr. Lipke Holthuis, National Museum of Natural History, Leiden, The Netherlands.



Dick Meier

The samurai crab, *Dorippe* (now *Heikea*) *japonica*, showing on its back the remarkable resemblance to a scowling human face formed by grooves and elevated areas of the carapace (shell). This specimen is a male collected in Ariake Bay, off Kyushyu, Japan, in 1968, on loan to the Natural History Museum from the Rijksmuseum van Natuurlihke Historie, Leiden, The Netherlands. Total width across the crab's back at its widest point (the "cheeks" of the face) is only 20.4 mm (0.8 inches). The last two legs on each side are reduced and claw-like for carrying objects. In this specimen, the second walking leg on the left side has been lost and regenerated, accounting for its small size compared to the right side legs.

generations. And there are other old references pointing out the similarity of these crabs to human faces. In the Wakan-sansai-zue, the second encyclopedia published in Japan (1716), there are illustrations of *D. japonica*, which at the time was called either Takebun-gani, after Takebun, who came to Japan at the time of the Mongolian invasion and was drowned, or Shimamura-gani, after Danjo Shimamura, slain in the fourth year of the Kyoroku era and whose spirit was said to hover about the area. Indeed, it seems likely that the man-crab legend even precedes the date of the battle of Dan-no-mura, and was merely fitted to those events later, rather than being newly created at that time. And it is not difficult to see how fishermen around the Sea of Japan could see these crabs and envision the reincarnation of the lost Heike samurai. The red coloration of these crabs in life was also thought to reflect the Heike, as some versions of the *Heike monogatori* list red as the color of the flags of the House of Taira.

The second myth is that the crabs did not always look like they do now. Rather, the story goes, the resemblance to a human face, and especially to a samurai face, was created by artificial selection. Artificial selection is man's version of natural selection, where certain lineages survive not because of the forces of nature, but by man's intervention. Examples are very common; all domestic animals are the result of purposeful intervention (selective breeding) by man. According to the samurai crab story, Japanese fisherman, who have plundered these waters for thousands of years, would throw back any crab caught in their net if it resembled a human face, especially the face of the long lost Heike, keeping and eating only those crabs that did not make them feel cannibalistic. Many years of throwing back faced crabs and weeding out (eating) normal crabs resulted in the faced crabs being the major contributors to the gene pool, with man in the role of a selective force shaping subsequent populations: a very pretty example of evolution over a relatively short time span, and one of sufficient interest to have filtered down to popular articles on natural history. In fact, the well-known evolutionary biologist Julian Huxley (grandson of the more famous T. H. Huxley, who was known as Charles Darwin's "bulldog" for his adamant support of Darwin's then-controversial ideas about natural selection, and brother of the novelist Aldous Huxley) wrote about these crabs in Life magazine in 1952, stating that "the resemblance of *Dorippe* to an angry Japanese warrior is far too specific and far too detailed to be accidental; it is a specific adaptation which can only have been brought about by means of natural selection operating over centuries of time. It came about because those crabs with a more perfect resemblance to a warrior's face were less frequently eaten than the others." More recently, samurai crabs were used to illustrate the power of artificial selection in Carl Sagan's popular 1980 book Cosmos. Both accounts make for interesting reading, and tell the story of crabs turned into samurai likenesses by human hands.

Interesting reading, but it isn't true.

The grooves and ridges on the backs of crabs have specific purposes and are not merely decorative. The grooves are external indications of supportive ridges, called apodemes, inside the crab's carapace that serve as sites for muscle attachment. Elevated areas between these grooves allow for an increase in internal space, so that the various

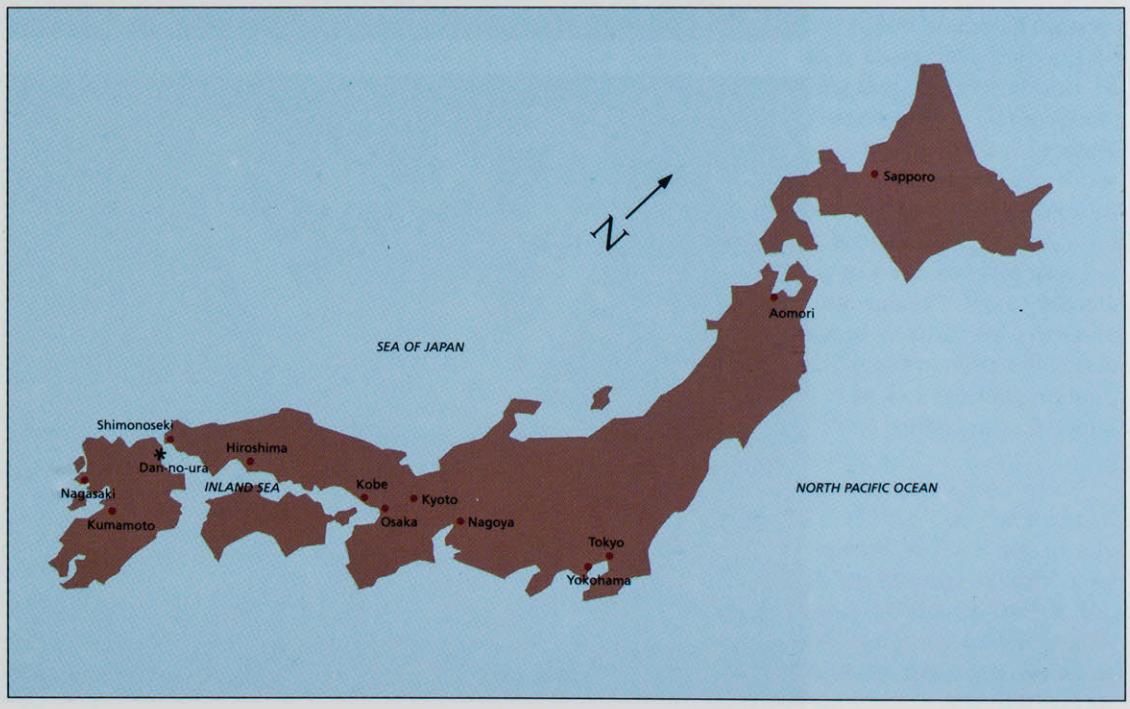
Nineteenth-century woodblock Kabuki print by Utagawa Toyokuni III.

Although *Heikea japonica* is the best known of the "faced" crabs, several other species have a carapace (shell) that bears a likeness to a human face when viewed from above. On the top is *Paradorippe granulata,* a northwestern Pacific species that, like *H. japonica,* bears an obvious resemblance to the scowling face of a samurai warrior. In the center is *Dorippe sinica,* known only from Japan, a species with markings that are similar to, but less distinct than, those of *H. japonica* and *P. granulata.* On the bottom is the northeastern Atlantic *Corystes cassivelaunus,* a species unrelated to the dorippids (it is a member of the family Corystidae) but nevertheless bearing markings slightly reminiscent of a human face on its back because of similar functional constraints of the carapace. Perhaps because the similarity to a human face is weak, one of the common names for this species is "masked crab." Specimens courtesy of Dr. Lipke Holthuis and C.H.J.M. Fransen, National Museum of Natural History, Leiden, The Netherlands. Photos by Dick Meier.

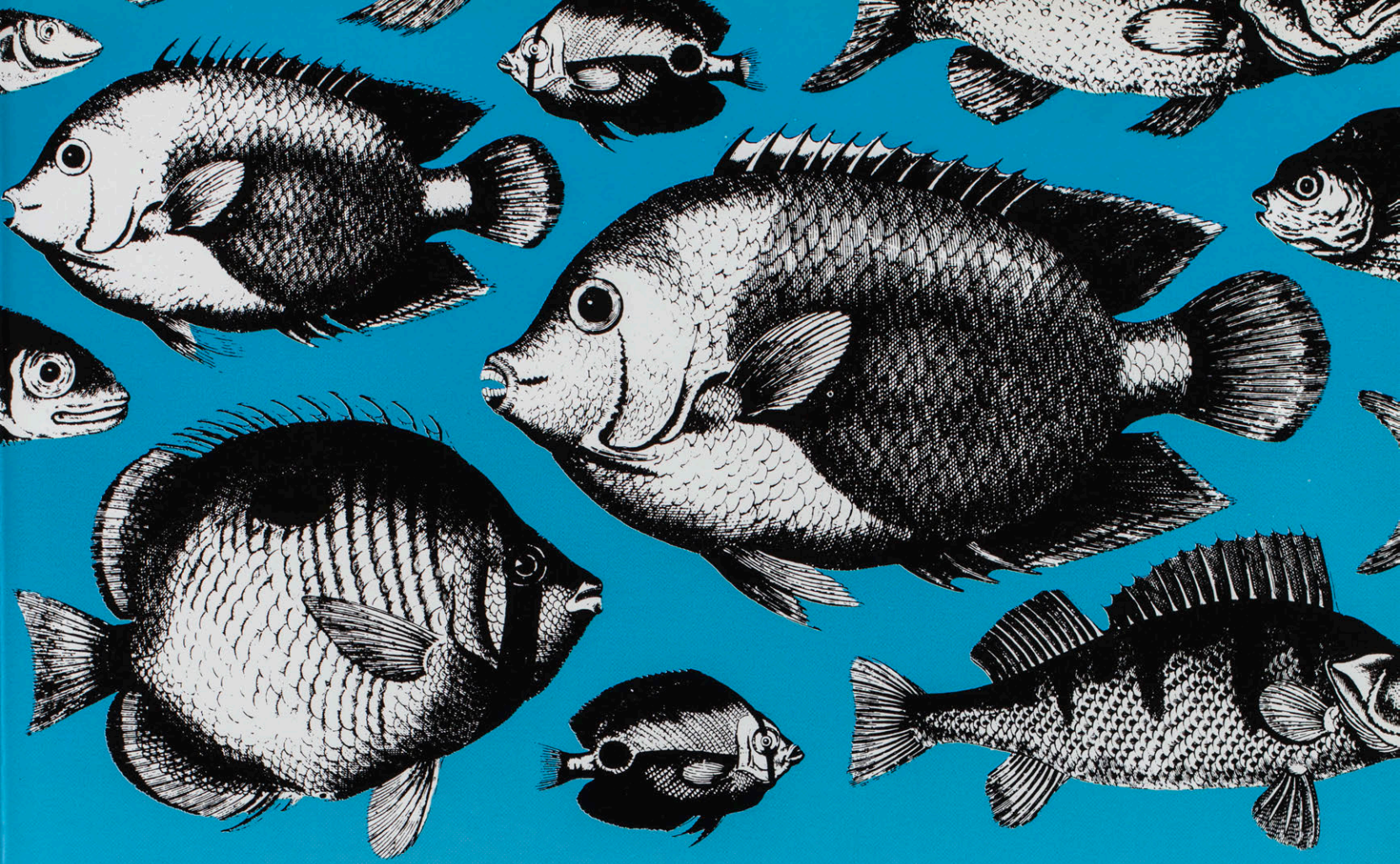
parts of a crab's viscera — gastric, hepatic, cardiac, branchial, etc. — are reflected externally. This is not to say that these structures are unaffected by selection. They are as subject to evolutionary pressures as any other feature of a crab. The point here is that these ridges and grooves occur in nearly all members of the crab family Dorippidae, whether they live near Japan or not. As pointed out by the great Japanese carcinologist Tune Sakai, there are at least 17 different species of crabs in two families in the Indo-West Pacific that are similar enough to be called *Heike-gani* by local residents, and there are many related species from other far off waters that bear a likeness to a human face. Many Asian countries have vernacular names to account for the similarity of such crabs to a human face, such as the Chinese name Kuei Lien Hsieh (Ghost or Demon faced crab), and in several countries the crabs play a prominent role in local folklore, sometimes being considered sacred, with the face representing that of a deceased relative. In the northeast Atlantic, the crab *Corystes cassivelaunus*, although only distantly related to dorippids (and belonging to a separate family, the Corystidae), bears a similar arrangement of grooves and elevations of the carapace that have resulted in one of its common names, the "masked crab." Additionally, fossils of dorippid crabs or closely related crab species are known from sites predating man's appearance on earth. Furthermore, and most damning to the myth of reincarnated samurai warriors, the fisherman who make their living from the Sea of Japan do not eat *any* of these crabs. Whether they resemble a samurai, a human face, or merely a crab is a moot point; all are thrown back. For *Dorippe japonica* reaches a maximum size of only 31 mm (1.2 inches) across the back, not at all worth the trouble of retrieving from the nets, let alone sorting through to see which ones resemble a face and which do not.

And yet the Heike will not be forgotten. A recent revision of the crab family Dorippidae found that the species *Dorippe japonica* differs in several respects from other members of the genus *Dorippe* — so much so, in fact, that it was necessary to place the species in a separate higher taxonomic category (genus). And following the rules of priority in handing out scientific names, the name *Dorippe* must remain where it was first used, necessitating that a new name be created to accommodate the samurai crab. Dr. Lipke Holthuis, formerly of the Rijksmuseum in Leiden, and Dr. Ray Manning, of the Smithsonian Institution's U.S. National Museum, performed the transfer and proposed the new name in 1990. And they chose a most appropriate one: the samurai crab will henceforth be known as *Heikea japonica*, in honor of the defeated Heike warriors who drowned at the hands of the Genji in the Inland Sea of Japan in 1185. And so the Heike will indeed be forever remembered in the form of crabs that roam the bottom of the Sea of Japan.

Joel W. Martin is Associate Curator of Invertebrate Zoology at the Natural History Museum. His research centers around the evolution and life histories of decapod and branchiopod crustaceans.



Map of southern Japan, showing the location of the battle of Dan-no-ura near what is today Shimonoseki, in the southern Inland Sea of Japan.



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Images of American Immigration

The United States has the highest level of legal immigration of any nation in the world. Fifty-nine million immigrants have been welcomed here since 1820, when record-keeping on the subject began. Twelve million new citizens have been sworn in in this century, with the most — 8.8 million — arriving between 1901 and 1910. Since the mid-seventies, California has been the most popular state for new immigrants.

In 1991, on its 100th anniversary, the Immigration and Naturalization Service initiated a national art contest in commemoration of its first century of work. The competition was also intended to honor immigrants, to remind Americans that we are a nation of emigrés, and to celebrate the ways in which the immigrant experience — one that almost always begins with courage and determination — has shaped our country.

Thirty-six images were selected from a field of 200 entries in the competition. These works of art began traveling in November of 1991 and will end their tour at the Natural History Museum after having visited cities in six states. They will be displayed in the museum's Rotunda from June 12 to August 15, 1993. The competition pictures selected for reproduction here are ones germane to California. The historical photographs document the immigration experience in real time, as it happened.

— The Editors

OPPOSITE
An immigrant family of the 1930s faces the future in America.

New citizens.

Immigration and Naturalization Service

AS A YOUNG COUNTRY IN need of settlers for new colonies and pioneers to open the West, America welcomed immigrants. People were needed to build industries and establish towns, and steady immigration began after the Revolutionary War. The vast majority of the country's earliest settlers came from western Europe. Their numbers caused concern even in the 18th century about how such an influx of newcomers might affect the nation. Benjamin Franklin worried that "This Pennsylvania will in a few years become a German colony . . . instead of learning our language . . . we must learn theirs . . . or live as in a foreign country."

But the states, not the federal government, regulated their boundaries, enacting their own laws and policies regarding immigration. This open door policy attracted huge numbers of immigrants, a trend that surged in the mid-1840s with the Irish potato famine and political unrest in Germany. The massive influx ushered in an era of prosperity and progress, helping stoke the fires of the Industrial Revolution. But the torrent of newcomers also fueled growing public sentiment against unrestricted immigration, and renewed worries that the new arrivals would take jobs away from native-born Americans. By the 1880s, the immigrant stream came from different sources — southern and eastern Europe — and the newcomers settled more in cities. Their numbers seemed greater (between 1860 and 1900 14 million came to the U.S.), but in actuality, the percentage of foreign-born in the total population was about the same as before the Civil War. Nevertheless, the fear of this "new" immigration led to restrictive legislation.

The Immigration Act of 1882 levied a head tax of 50 cents on every immigrant, and restricted for the first time the arrival of certain immigrants: the Chinese Exclusion Act, passed the same year, barred Chinese from entering the U.S. for ten years. The Immigration and Naturalization Service (under another name) had its modest beginning in 1891, with one superintendent; it was ten more years before the professional position of "immigration officer" was created by Congress.

Despite the new laws, the flow of immigrants continued at a record rate, most of the arrivals after 1900 coming through Ellis Island. Other important ports were those in Galveston, Texas and Angel Island in San Francisco Bay.

World War I slowed the stream of newcomers to a trickle, but after the war it began

National Archives

Seaver Center for Western History Research, Frank Layton Washburn Collection #2072

The Chinese called California *Jinshan* — the Golden Mountain. Willing to work hard for low wages, the Chinese were hired in huge numbers for labor in factories, on the railroad being built across the continent, and as farm workers. Immigrants arrived in such large numbers in the 1870s that the U.S. passed the Chinese Exclusion Act of 1882 to stem the tide and ease racial tensions arising from the Chinese immigrants' competition with native workers. This photo was taken on Los Angeles Street in the Garnier Block of Los Angeles' Chinatown around the turn of the century.

again, bringing new public demands for limits. Technology had produced labor saving machinery that reduced the need for more workers, and as jobs became more scarce, Congress came under pressure to take action. There was also fear of Bolsheviks and of letting in people from the "wrong" parts of the world.

In 1917, Congress passed the most restrictive immigration bill up to that time. It barred entry to people from most of Asia and the Pacific islands, and required, for the first time, that newcomers be able to read and write. A few years later, Congress set quotas on the number of immigrants who could come to the U.S. from any one country.

With these new restrictions, illegal immigration grew into a serious problem, with large numbers pouring in through Mexico. Realizing that inspectors were needed to monitor the country's borders, Congress set aside monies to establish the U.S. Border Patrol, and 450 officers were hired to guard 6,000 miles of border.

With the onset of the Great Depression in 1930, immigration collapsed once again, but by this time, the number of entry ports along land borders had more than doubled, and they stayed open 24 hours a day. Within less than a decade, tensions in Europe created new fears about national security, and by 1940 all aliens over age 14 were required to register and be fingerprinted. Following the attack on Pearl Harbor the next year, President Roosevelt declared that all German, Italian, and Japanese living in the U.S. should be considered enemy aliens. Hearings were held to decide whether each of them would be interned, paroled, or released.

Within two years, the INS had more than 9,000 enemy aliens in custody, most of them Japanese. Some would wait more than five years to gain their freedom. The end of the war brought new priorities, including the processing of large numbers of war brides and refugees.

Peacetime also brought a massive surge in the number of illegal immigrants from Mexico; there was also renewed fear of the spread of Communism. Under the Internal Security Act of 1950, "un-American activity" — including membership in the Communist Party — became grounds for deportation. However, the McCarren-Walter Act of the 1950s created new opportunities for aliens with relatives already in the U.S., as well as for aliens with special skills. By the end of the decade, the "red scare" had diminished, and the major concern of the INS was locating and deporting criminal aliens involved in drug trafficking and racketeering.

In the 1960s, Congress did away with the quota system based on national origin and gave priority to immigrants who had families in the U.S. This standard still plays a key role in our nation's immigration system.

For the next two decades, two topics — illegal immigration and the refugee problem — dominated the debate over immigration. The Refugee Act of 1980, designed to give sanctuary to unprecedented numbers of Cuban and Vietnamese exiles, was immediately put to the test when 120,000 Cuban expatriates — called "Marielitos" because they boarded out of Cuba's Mariel Harbor — arrived on the Florida coast in a five-month period. The Mariel boat lift still stands as the largest mass arrival of undocumented aliens in U.S. history.

After several years of bitter debate over the growing problem of illegal immigration, lawmakers approved the Immigration Reform and Control Act of 1986, which made it illegal to hire undocumented workers. The act also offered amnesty — with the ultimate prospect of citizenship — to illegal aliens. More than three million came forward. In the first year after the bill became law, the number of aliens apprehended entering the country fell off by almost half. Congress then set out to reform the nation's system of legal immigra-

OPPOSITE TOP

Angel Island, the immigration detention center in San Francisco Bay, became the American Bastille for tens of thousands of Asian immigrants. Though this photograph shows Japanese immigrants arriving at Angel Island, nearly 175,000 Chinese were confined there between 1910, when the station opened its doors, and 1940, when the facility was abandoned. Increasing restrictions made it more and more difficult for all Asians to gain permission to enter the U.S. Applicants spent weeks or months of fear and frustration on the island, waiting for a decision on their future. Angel Island is now a State Park with a museum honoring the Chinese who were held there.

This poem was among thousands carved in the detention barracks at Angel Island:

Instead of remaining a citizen of China,
I willingly became an ox.
I intended to come to America to earn a living.
The Western styled buildings are lofty; but I have not the luck to live in them.
How was anyone to know that my dwelling place would be a prison?

National Archives

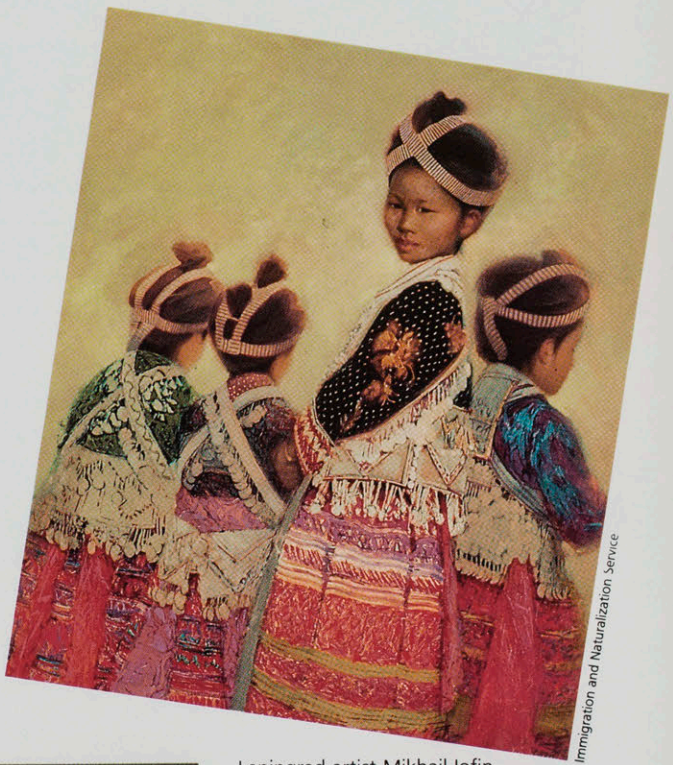
BELOW

Lois Johnson grew up listening to her immigrant parents talk about life in the old country. She spent many years out of her native California, but returned to live in the San Joaquin Valley, where she was immediately impressed by the diversity of immigrants who had settled there in her absence. Her painting of Laotian *Hmong* women, entitled *New Year in America,* shows three subjects with their backs to the artist and one facing her. "For me," said Johnson, "it shows the dilemma faced by all immigrants, the need to keep one eye trained on the past while at the same time looking to the future."

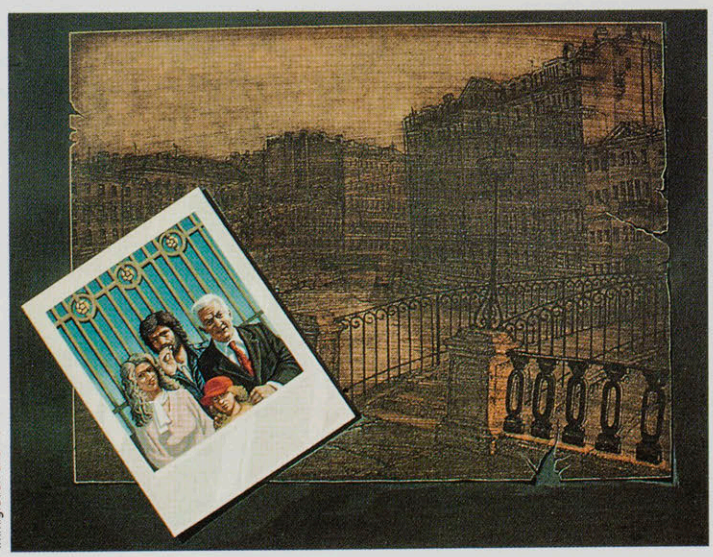
tion, passing the Immigration and Nationality Act of 1990, which significantly increased the number of immigrants allowed to come to the U.S. on a yearly basis, and provided more visas for highly skilled workers and foreign investors.

The Immigration and Naturalization Service compiles data yearly on the results of its operations. Data for 1992 had not been published at the time TERRA went to press, but in 1991, immigration to the U.S. was at an all-time high, with approximately 77 percent of all immigrants intending to reside in six states: California, Texas, New York, Florida, Illinois, and New Jersey. Also at an all-time high was the number of alien border crossings (counting both legal and illegal), while the number of deportable aliens apprehended increased only slightly over 1990. About 3,500 border patrol agents — fewer officers than New York City hires to patrol its subway system — are now charged with guarding our more than 6,000 miles of land border.

Compiled by Ann Seaman.



Immigration and Naturalization Service



Immigration and Naturalization Service

Leningrad artist Mikhail Iofin, forbidden to show his paintings at authorized exhibitions, fled the Soviet Union for San Francisco in 1991, seeking asylum. His entry in the INS exhibit, *Letters From Home #3,* is one of seven such images in a series. "To a large extent," says Iofin," [the series] is my own family's story . . . a chronology of our century, in which private life and its little mementos have become the data of history through which one can recognize epochs of revolution, of civil and world wars, of famine, of persecution . . . all as if read between the lines of cautious letters written to someone who had already left the world of these things."

Southland Diorama

The Gopher Snake

Strolling through the oak-studded grassland of a southern California natural area on a sunny spring morning, you are startled by the sight of a large snake stretched across your path. Unable to see the animal's tail but recalling trailhead warnings of rattlesnakes in the area, you note the rattlesnake-like dark blotches on its back. In response to your approach, the reptile suddenly draws into a series of coils, the poised head flaring into a triangular shape. A loud hiss issues from its gaping mouth, and the tail begins to vibrate. Finally, the provoked serpent strikes, its head and neck lunging toward you. As you and the snake both retreat, you observe that the tail lacks a rattle and tapers to a point.

What you witnessed is the classical threat display of the Gopher Snake, *Pituophis melanoleucus*. The similarity of this harmless snake to rattlesnakes was noted as early as 1804, in the journals of Lewis and Clark's expeditions to the Northwest territory, and gave rise to the persistent myth that Gopher Snakes and rattlesnakes can interbreed.

In the biological literature, the Gopher Snake has been cited as an example of mimicry, in which a non-venomous species attains a degree of protection from predators as a result of similarity in appearance and behavior to a poisonous species. However, if this is the case with the Gopher Snake, it is not a simple one. As one herpetologist has recently pointed out, similar threat displays are produced by a wide variety of harmless snakes that do not otherwise particularly resemble venomous species. Also, in many coastal and montane areas of southern California, the Western Rattlesnake is the only venomous snake that occurs with the Gopher Snake, and in this region the two differ in color pattern. The Gopher Snake's pattern is most camouflaging in the grasslands and fields where it predominates, whereas Western Rattlesnakes have larger blotches that are more cryptic in the chaparral and woodland environments where they are more abundant. Nevertheless, in some areas of the Central Valley where the two occupy the same habitat, they are extraordinarily similar, and it is here that Gopher Snakes most often give their threat display.

Gopher Snakes may live as long as 20 years and attain a total length of over 2.5 meters (eight feet), although individuals longer than 1.8 meters (six feet) are rarely encountered. They are effective predators: in addition to pocket gophers they eat a wide variety of other rodents, from mice to ground squirrels, as well as rabbits, birds, eggs, lizards, and insects. Gopher Snakes are sometimes seen in bushes and trees, searching for bird nests, and they are capable of unplugging rodent burrows. They first loosen the soil with their sharp-keeled snout, and then remove it with sideways movements of the head. The prey is struck, held with the mouth, and then killed by constriction.

The males occasionally have been observed participating in a strange ritual, the function of which remains unclear. As two males approach each other, one slithers over the back of the other and attempts to throw or move it with sideways loops of his body. The two snakes entwine as the aggressor tries to force the head of his opponent to the side. The struggle may last more than an hour, punctuated by the sounds of scales rubbing together, loud hissing, and biting. This ritualized combat may be associated with competition for territories, food, or females.

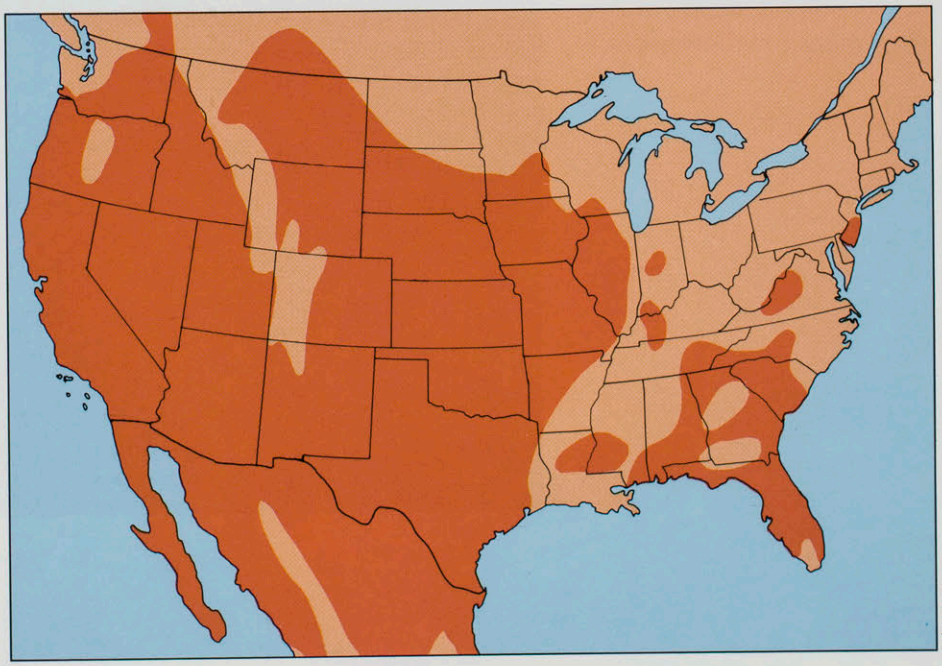
Pituophis melanoleucus is widely distributed in North America, ranging from coast to coast and from southern Canada to Zacatecas, Mexico. In the U.S. it is called a Gopher Snake in the Pacific states, a Bullsnake in the remainder of the West and Midwest, and a Pine Snake in the East. That these represent a single species is questioned by some herpetologists because there is a lack of evidence that some of the distinctive forms interbreed in nature. The name *Pituophis* means "phlegm snake" in reference to a unique keel-shaped structure in the throat that amplifies the animal's hissing sound, which is produced by air expelled through the opening of the wind pipe. The unusually loud hiss may also be responsible for the name Bullsnake, as the sound was likened by early settlers to the snort of a bull.

The museum's herpetological collection contains significant holdings of the species from throughout its range. They are essential for continuing studies of distribution, variation, and evolutionary relationships, and aspects of ecology. The most definitive study published to date of the life history, ecology, and diet of the species was dependent on the use of this material.

Robert L. Bezy
Curator, Section of Herpetology

Southland Diorama is a Terra column that highlights the incredible diversity of animal and plant life still to be found in southern California. Each issue features an example of one of the many species — extant and extinct, native and introduced, abundant and endangered — that are found in astonishing variety in one of the world's largest urban centers.

Robert L. Bezy



Robert L. Bezy

Acquisitions

The Case of the Sword-Swallowing Shark

A retired farmer and very knowledgeable archaeologist and paleontologist, Jerome Bussen, collected and recently donated to the Natural History Museum a unique pectoral fin of *Protosphyraena nitida*. The uniqueness lies not so much in the fin itself, but in the fact that it reveals on its surface both the likely cause of its death and the identity of its assassin.

About 85 million years ago, North America was divided into two large islands by an epicontinental seaway running from the Gulf of Mexico to the Arctic Ocean. Unlike an ocean, this body of water stretched across a continental mass. In this respect, it would be much like the Bering Strait, which lies astride a continuous continental surface that joins Siberia and Alaska. The area that is today the very land-locked state of Kansas was then entirely beneath the waves. The mud and ooze that formed the floor of that sea is today known to earth scientists as the Niobrara Chalk Formation, but to the locals, it is the "chalk beds."

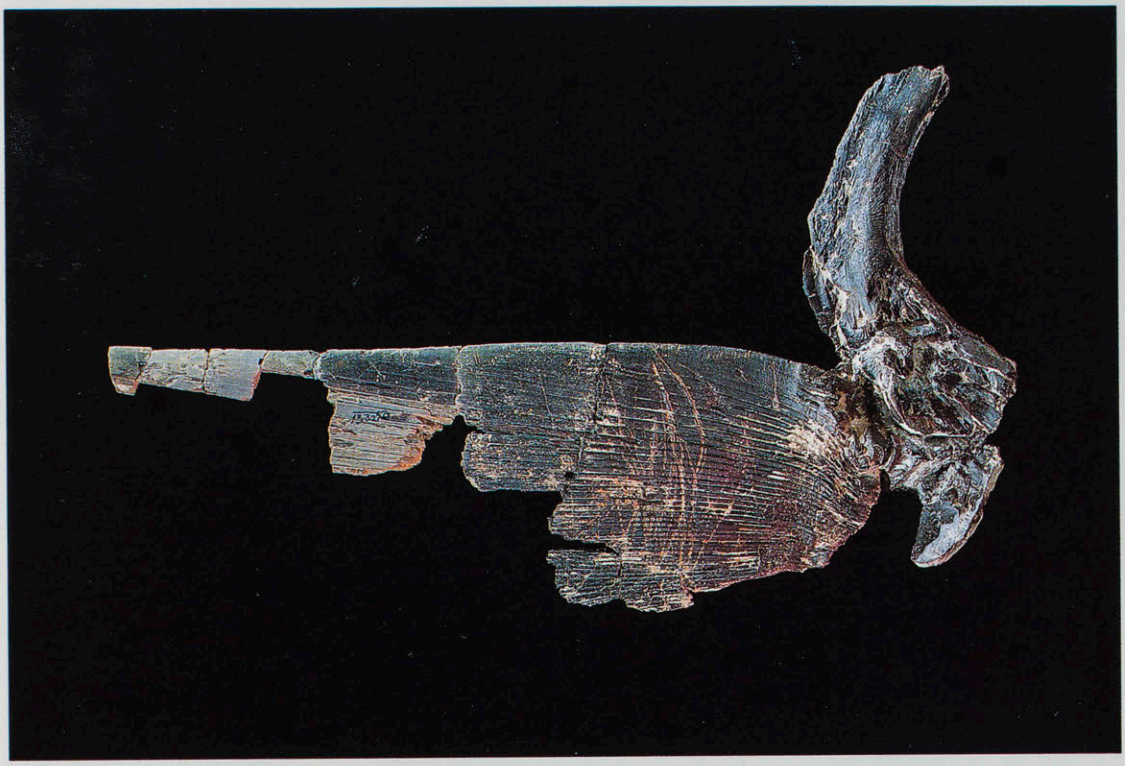
To judge from the bizarre and fearsome creatures that have been excavated from these rocks, it would not have been a good place to scuba dive. Predatory sharks every bit as large as the Great White Shark were common, as were mosasaurs, which were large (5-9 meters or 18-30 feet) marine lizards. Even the birds had teeth. More *Pteranodon* remains have been found in these beds than in all the rest of the world combined. We believe that the only dinosaurs found in these rocks were "floaters" (carcasses that had rafted out that far before they sank), because science knows of no marine dinosaurs.

One of the more interesting fish must have looked rather like a marlin, but was more primitive than any living teleostean (bony) fish. Its name, *Protosphyraena*, means "proto-barracuda" because of its barracuda-like teeth. It had a bill much like a marlin, and a lower jaw set well back from the bill. A pair of forward-pointing fangs armed the tip of the lower jaw and opposed a similar pair in the upper jaw. The tail was very like that of a tuna, but the axial skeleton connecting the head and the tail didn't even have vertebrae. The pectoral fins were spectacular. In some species, they were each more than one meter (three feet) long and had serrated edges. In the species that concerns us, *Protosphyraena nitida*, the pectoral fin was unserrated and about 35 centimeters (14 inches) long.

Our *Protosphyraena nitida* is unique in that it seems to have been used by a shark as an all-day sucker. Both the upper and lower surfaces are scarred by the telltale arcuate grooves that resulted from a fatal case of shark bite. The orientation of these grooves, with the convex side of the grooves toward the fish's body, clearly shows that the shark had this fin down its throat, and the grooves show that they were created by a shark with serrated teeth. Only one shark in that ecosystem had serrated teeth: the cosmopolitan *Squalicorax falcatus*. This 1.8-3 meter (6- to 10-foot) fish had teeth much like those of the living tiger shark. *Squalicorax* must have been a dedicated scavenger if not a zealous predator; its diagnostic bite-marks are found on many turtle and mosasaur bones and skeletons. However, fish bones tend to be less dense than reptile bones, and rarely preserve these details. This specimen proves that the diet of *Squalicorax* included fishes.

J.D. Stewart
Assistant Curator, Vertebrate Paleontology

The objects that museums acquire and preserve are in effect a permanent record of human endeavors and the natural world: at the heart of all of the Natural History Museum's activities are its collections. In Acquisitions, *Terra showcases a recent addition to the museum's holdings of more than 35 million specimens and artifacts.*



Dick Meier

It can be difficult to distinguish between predation and scavenging in the fossil record. The only unequivocal indicators of predation are healed wounds. There is no sign of healing on this badly-gnawed *Protosphyraena nitida* fin bearing bite-marks of *Squalicorax*.

Dick Meier

The skull of *Protosphyraena nitida* looks very much like that of a marlin except that it has barracuda-like teeth. This specimen, collected in the Niobrara Chalk Formation of Kansas and donated to the Natural History Museum by Pamela A. and Michael J. Everhart of Derby, Kansas, is possibly the most complete skull of *Protosphyraena* in any museum.

Focus on the West

Florence Lawrence

THIS PHOTOGRAPH SHOWS Florence Lawrence, America's first movie star, in a scene from the 1912 silent film "All For Love." The one-reel film, like many of the era, was probably only 5-12 minutes long. Lawrence appeared in many films with one or both of these actors, brothers Owen and Matt Moore.

Lawrence began appearing in films in 1908, at a time when film promoters relied on the name of the production company rather than the actors to sell their products. Even in the films themselves, the actors weren't identified by name. Still, Florence Lawrence, who made over 30 films for the Biograph Company in 1909 and 1910, became easily recognizable to movie audiences as the "Biograph Girl."

In 1910, after leaving Biograph and joining Carl Laemmle's Independent Motion Picture Company (IMP), Lawrence gained more fame and achieved name recognition. Initially, Laemmle simply attempted to change Lawrence's identity from the Biograph Girl to the IMP Girl by placing advertisements featuring her face and the declaration, "She's an Imp!" Laemmle went a step further when he orchestrated what may have been the first publicity stunt designed to promote a movie actor. It started with a newspaper report that the Biograph Girl was killed in a streetcar accident. Laemmle accused officials at Biograph of planting the story, but it is just as likely that he concocted it himself to draw attention to his film company. In any case, Laemmle followed the news story with an advertisement assuring the public that "Miss Lawrence" — who was specifically named for the first time — was alive. After the advertisement appeared, Lawrence made well-publicized visits to several St. Louis Theaters. As crowds gathered to meet Florence Lawrence, it was clear that she had become a star.

The Seaver Center for Western History Research has a collection of Florence Lawrence's papers that includes letters, clippings, film scenarios, and photographs.

Janet Evander
Senior Collections Manager
Seaver Center

Focus on the West *is a* Terra *feature that presents the photographic highlights of the museum's Seaver Center for Western History Research. The Seaver Center is rich in photographs and other materials relating to the history of the American West.*

Florence Lawrence Papers, P-169

continued from page 5

programs at the Page Museum of La Brea Discoveries. UNOCAL's gift underwrote the costs of the Page's study guide, which outlines additional activities to reinforce the learning experiences available to schools and other tour groups before and after their visits to the Page. The Museum Research Apprentice Program, which enables 30 talented high school students to study science for a full year with museum curators and educators, received a generous gift from the Bannerman Foundation. An anonymous donor contributed support for the Moveable Museum Program, through which museum docents travel to educational facilities, hospitals, nursing homes, and board and care facilities throughout southern California to present multisensory activities on topics such as prehistoric reptiles, forest animals, and early American history. Through the Smith-Welsh Foundation, Jim and Nancy Welsh also gave generously to the museum's exhibition and education programs. Great Western Financial Corporation provided support for programs at the William S. Hart Museum in Newhall, and the Hugh and Hazel Darling Foundation contributed to the museum's educational programs for children.

During spring and summer, the museum emphasizes programs designed to raise public awareness of environmental issues in our commu nity. The Environment Now Foun dation gave a generous gift to Global Warming: Understanding the Forecast, an important exhibition about the potential dangers of global climate change. Gifts from W. Owens Miller and Pacific Enterprises will support the museum's education programs for another exhibition focusing on one of southern California's unique ecosystems: The Vanishing Desert: California's Threatened Habitat. The Greenville, Shea, and J. Douglas and Marian R. Pardee foundations supported the museum's Key Environmental Education Programs (KEEP), which address these critical concerns through docent tours, teacher workshops, Discovery Center programs, and student research internships.

The J.C. Penney Company, Incorporated, generously supports the Free Day at the Museum Program, which enables thousands of inner-city children, families, and community groups to visit the museum without charge on the first Tuesday of each month. Over the winter holiday season, a gift from Imperial Toy Corporation brought the popular animated Kokoro Dinosaurs back to the museum. United States Borax & Chemical Corporation continued its multiyear support with a generous gift to the twenty-first annual American Indian Festival and Market. The Pacific Telesis and Circuit City foundations gave generously to Backyard Monsters: The World of Insects, our premier exhibition at the May opening of the new Natural History Museum of Los Angeles County at Burbank, next to the Media City Center.

The Natural History Museum extends its heartfelt thanks to Trustees, Fellows, and Members who gave generous year-end gifts to the museum. Among them are Mr. Robert S. Attiyeh, Mrs. Ruth Behn, Mrs. Elaine Leventhal, Mr. G. Everett Miller, Mrs. Betty J. Reddin, and Mrs. Barbara White-Thomson, who secured an additional gift from the United States Borax & Chemical Corporation.

■ **BUSINESS ASSOCIATES** On February 3 the Business Associates held a breakfast with Angelo Mozilo, Vice Chairman and Executive Vice President of Countrywide Funding Corporation, as the featured speaker. Mr. Mozilo outlined his corporation's highly successful mortgage lending program for minority families. In addition, Countrywide supports the museum's Research Apprentice Program. The program's coordinator, Susan Lafferty, gave an overview of the program, and two student participants described how their experiences have helped them achieve their academic and career goals. A tour of the museum's Discovery Center followed the breakfast program.

PUBLICATIONS

■ **GIFT HONORS CHARLES L. HOGUE** Mr. and Mrs. James A. Robertson have made a gift to the museum in memory of Charles L. Hogue, Curator of Entomology for more than 30 years. The donation will support publication of *Insects of the Los Angeles Basin*, which Dr. Hogue had just completed at the time of his death in the summer of 1992.

The Robertsons, who are long-time Distinguished Friends of the museum, have a special interest in entomology; Mr. Robertson studies and collects beetles, and both had travelled with Hogue on collecting expeditions in the U.S. and in Central and South America.

The new book provides identification, lore, and illustration of almost 500 species of southern California insects and spiders; it is scheduled for release in summer 1993.

■ **TERRA PLACES IN COMPETITION** Two issues of TERRA were finalists in the Western Publications Association's 1992 "Maggie" competition. The Summer 1992 issue (with "Encountering the New World" on the cover) and the Fall 1992 special issue on Rancho La Brea were chosen from among more than 1,500 entrants.

■ **TERRA VOLUME 30 INDEX AVAILABLE** The index for Volume 30 of TERRA (Fall 1991, Winter 1991, Spring 1992, and Summer 1992) is available upon request from the museum Publications Office, 900 Exposition Blvd., Los Angeles 90007.

Litton

The Natural History Museum of Los Angeles County is an abundant source of knowledge and enjoyment for people of all ages. Litton is proud to be a contributor to this important community asset!

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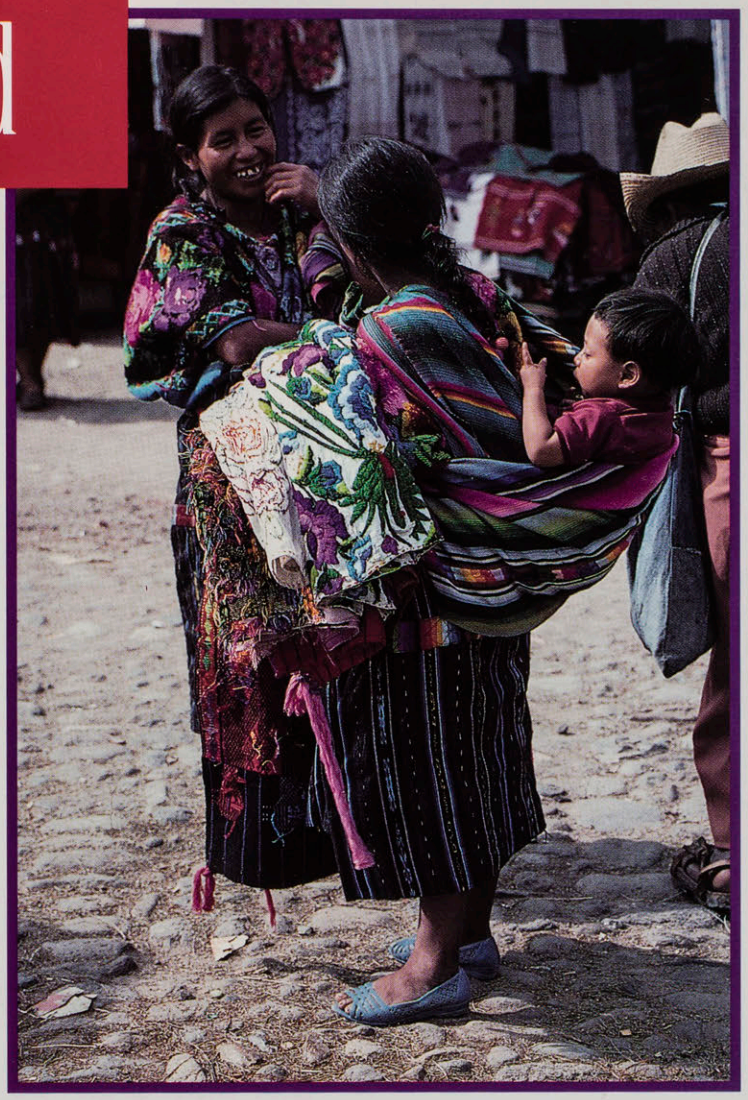
Your View to the World



Costa Rica Natural History

AUGUST 13 - 25, 1993

Explore this naturalist's paradise with Robert Gustafson, the Natural History Museum's Collections Manager in Botany. Delight in Costa Rica's tropical rainforests, cool cloud forests, and tropical alpine regions. You may see an incredible abundance of wildlife, including the resplendent quetzal, scarlet macaw, howler monkey, three-toed sloth, green sea turtle, poison-dart frog, and coatimundi. Our itinerary includes the Monteverde Cloud Forest Reserve, Lomas de Barbudal Reserve, Santa Rosa National Park, Cano Negro National Wildlife Refuge, and Tortuguero National Park.

$2,995 including air fare.

Bridging the Bering Strait

AUGUST 20 - SEPT. 3, 1993

Join us on a voyage of Arctic exploration aboard the 138-passenger "World Discoverer," ice cruising through the Bering Sea, spanning the continental shores and islands of Alaska and the Russian Far East. Our expedition promises to be an exciting photographic journey, filled with wildlife, from prolific seabird colonies to the "haul outs" of hundreds of walruses, to whale-spotting in the narrow straits we'll cruise. Stops will include Kodiak, the Katmai Peninsula, Semidi Islands, Pribilof Islands, St. Matthew Island, Gambell, St. Lawrence Island, Provideniya, the Arakamchechen Archipelago and Nome. Dr. Ed Mitchell, Research Associate in Marine Biology at the Natural History Museum, will be your escort.

From $4,150 plus air fare

For further information, please contact Karen Hovanitz, Natural History Museum Travel Program, (213) 744-3350
Proceeds from the Travel Program benefit the Natural History Museum.

Photography: Eric Hovanitz

Turkey: Cradle of Civilization

SEPTEMBER 18 - OCT. 6, 1993

Exotic and thrilling, Turkey offers a wonderful blend of Roman ruins, glimpses into the Ottoman, Hittite and Byzantine eras, and traditional arts and crafts. Visit Cappadocia, an area of unique geologic features and fascinating early Christian history. Continue to Konya and Pamukkale, the famous "Niagara in Stone", where steaming water cascades into a series of pools, crystallizing into stalactites and fans. Experience Antalya, Bodrum and Ephesus. Sail along the Gokova Coast in "gulet" yachts before concluding your tour in Istanbul, the intriguing city where east and west blend.

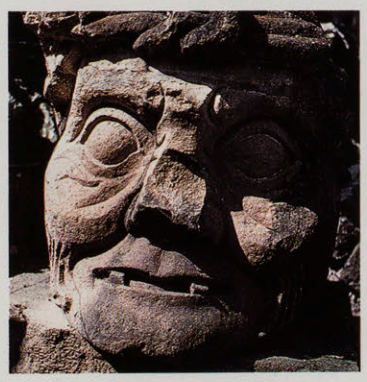
$3,395 plus air fare.

Egypt and the Nile by Yacht

SEPT. 28 - OCT. 14, 1993

Journey back in time to the golden age of the Pharaohs on board your own 50-passenger luxury yacht, stopping along the Nile to explore Beni Hassan, Tuna El-Gebel, Tel 'El Amarna, Abydos, Dendera, Luxor, Esna, Edfu, Kom Ombo and Aswan, and to observe the timeless scenes of life along the river. Visits to Cairo, Giza, Memphis, Saqqara, and Abu Simbel will also be included. Dr. Nabil Swelim will be your resident Egyptologist.

$5,932 including air fare.



Guatemala: Heartland of the Ancient Maya

NOV. 30 - DEC. 14, 1993

Explore the heartland of the ancient Maya with noted archaeologist Dr. Richard Hansen. Each site on our tour has been carefully chosen to reveal a different facet of the history, religion, and art of this fascinating civilization. You may climb the famous temples at Tikal, deep in the rainforest, and explore Quirigua and Copan in Honduras, as well as bargaining for beautiful textiles in Chichicastenango's bustling market. Colonial Antigua, modern Guatemala City, and dramatic Lake Atitlan round out our itinerary. Archaeologist Wiggy Andrews will also join us.

$2,670 plus air fare.

Wings Over Kenya

OCTOBER 28 - SEPT. 12, 1993

Your photo safari includes the best of Africa, beginning in Nairobi, where you will visit the Leakey Exhibition and Karen Blixen's home. Mount Kilimanjaro dominates your next stop at Amboseli National Park, where bird life is particularly rich and varied. At Aberdare National Park, you'll stay at The Ark, watching for Cape Buffalo and antelope. After resting at the Mount Kenya Safari Club, you'll fly by private aircraft to Samburu, home of gazelle, zebra, and giraffe. Your last stop is in the great Masai-Mara National Reserve, home of the elephant, rhinoceros, leopard, and Cape Buffalo.

$5,649 including air fare.

SUMMER / FALL 1993

Museum Travel Program

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